COMPAQ

Integrated Remote Console
User Guide

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Compaq Integrated Remote Console User Guide

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Contents

About This Guide

This guide is designed to be used as step-by-step instructions for installation, and as a reference for operation, troubleshooting, and future upgrades.

Text Conventions

This document uses the following conventions to distinguish elements of text:

Keys	Keys appear in boldface. A plus sign (+) between two keys indicates that they should be pressed simultaneously.
USER INPUT	User input appears in a different typeface and in uppercase.
FILENAMES	File names appear in uppercase italics.
Menu Options	These appear in italic initial capital letters
Command Names, Dialog Box Names	These appear in initial capital letters.
COMMANDS, DIRECTORY NAMES, and DRIVE NAMES	These always appear in uppercase.
Type	When you are instructed to *type* information, type the information **without** pressing the **Enter** key.
Enter	When you are instructed to *enter* information, type the information and then press the **Enter** key.

Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.

> ⚠ **WARNING:**   Indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

> △ **CAUTION:**   Indicates that failure to follow directions could result in damage to equipment or loss of information.

> **IMPORTANT:**   Presents clarifying information or specific instructions.

NOTE: Presents commentary, sidelights, or interesting points of information.

Getting Help

If you have a problem and have exhausted the information in this guide, you can get further information and other help in the following locations.

Compaq Website

The Compaq website has information on this product as well as the latest drivers and Flash ROM images. You can access the Compaq website by logging on to the Internet at http://www.compaq.com.

Telephone Numbers

For the name of your nearest Compaq Authorized Reseller:

In the United States, call 1-800-345-1518
In Canada, call 1-800-263-5868

For Compaq technical support:
In the United States and Canada, call 1-800-OK COMPAQ (For continuous
quality improvement, calls may be monitored or recorded.)

For Compaq technical support phone numbers outside the United States and
Canada, visit the Compaq website at:

http://www.compaq.com.

Chapter 1
Introduction

Compaq Integrated Remote Console (IRC) is an integrated hardware function that provides remote access and remote control to diagnose server failures interactively. IRC gives authorized users direct access to the managed server, independent of the operating system or other software, from locations a few feet away or from another continent.

Ability to control the server is not dependent upon any special software running on the server, nor is it restricted to when the managed server is in a particular state (like running BIOS). An administrator now has the ability to access the server, perform diagnostics, reset the system, watch the reset process remotely, and view Automatic Server Recovery sequences, regardless of whether the server operating system is online or offline.

IRC capability is built into your server. No add-on system management board is required.

Integrated Remote Console Capabilities

The primary capabilities of IRC let you:

■ Access the server via modem from a distant location

■ Access the server via direct-line connection to a terminal or terminal server

■ Remotely control the managed server with complete remote console access, regardless of the state of the server operating system

■ Perform a controlled reset of the server, regardless of the state of the server operating system

■ Cycle the power, unconditionally resetting all features and internal peripherals, followed by automatic reconnection to Integrated Remote Console

■ View a complete boot sequence including all ROM POST messages and operating system load information following an Automatic Server Recovery event

- View a log of Integrated Remote Console events

- Allow users without supervisory access to modify their login passwords
  Allow supervisory users to control access by other users

- Remotely change the configuration parameters of Integrated Remote Console

Benefits of Using Integrated Remote Console

IRC advantages include:

- Integrated, low-cost, hardware-based out-of-band management

- Support for most standard, high-speed modems

- Independent of the server operating system

- Full-text mode support

- Realistic remote console performance

- ANSI compatible

Requirements

To use IRC, you must have:

- A Compaq server equipped with IRC (listed in your server's features)

- Hayes-compatible, controller-based modem for the managed server (for modem-based out-of-band access) or appropriate cable to couple server to a terminal or terminal server

- Management console equipped with the appropriate communications hardware to establish a connection to IRC

- Communications software that includes the ANSI terminal emulation feature

Installation Sequence Outline

In preparation for using IRC, the following tasks must be performed:

■ Prepare the management console with the necessary hardware and software for out-of-band communication

■ Prepare the managed server for out-of-band communications by installing a modem or connecting the managed server to a suitable communications device

■ Configure the usage and communication parameters of IRC

■ Set up a list of authorized users and their permissions in the IRC user database
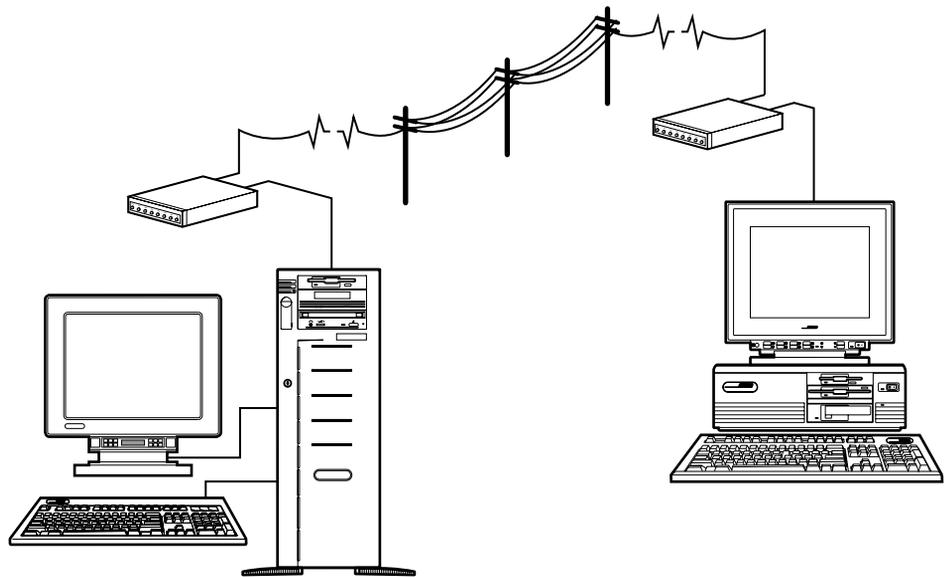
Figure 1-1. Communication topology showing a modem-based out-of-band connection between a managed server, left, and a management console, right

Terminology

Table 1-1 lists the standard terms used throughout this guide.

Table 1-1
IRC Terminology

Term	Definition
Managed Server	Server that contains IRC or server which can be remotely managed through a variety of Compaq tools.
Management Console	Computer that runs management applications or collects management data.
Management Application	Software running on the *management console* that collects management data and/or provides access to the *managed server*.
Terminal Server	Multiple port device that includes several serial port connections and allows access to the managed server via direct-line connection.

Accessing Integrated Remote Console

Integrated Remote Console can be accessed through either Compaq Insight Manager or through any communications package that supports ANSI terminal emulation. It can be accessed through Compaq Insight Manager by configuring the modem remote console feature associated with the managed server. When accessed through Insight Manager, Integrated Remote Console supports dynamic text mode changes and extended keyboard functionality, including the function and alternate keys.

Integrated Remote Console can also be accessed through any ANSI terminal emulation program. This gives you multiple options in the choice of a server management console application. In addition, Integrated Remote Console supports complex keystroke combinations. You can synthesize complex combinations, such as function and alternate keys, which would otherwise be unavailable through the ANSI standard. As a result, virtually any keystroke combination can be entered from any terminal emulation package. Integrated Remote Console also supports different terminal line modes (for example, 80 x 25 or 80 x 50) in both monochrome and color.

Expected Audience

This document assumes that you are familiar with the setup and configuration of Compaq server hardware and that you have a working knowledge of Compaq Insight Manager. The *Compaq Insight Manager User Guide* is referred to throughout this document.

Chapter 2
Setup and Configuration

This chapter describes the steps required to implement Integrated Remote Console (IRC) using an internal modem, external modem, or direct serial port connection.

See Chapter 6 for information on supported modems and for additional information pertaining to the appropriate configuration of modems with IRC.

To operate IRC by modem, the management console must be equipped with a modem that is compatible with the modem in the managed server. Using different classes of modems in the management console and managed server, particularly if they are from different manufacturers, can cause various connection problems, including the inability to obtain a login prompt. Using the same type of modem from the same manufacturer in both the management console and managed server is strongly recommended.

> **IMPORTANT:** Most connectivity problems are caused by modems that default to a "*floating*" computer-to-modem (or DCE-to-DTE) port speed. (U.S. Robotics modems and others). For Integrated Remote Console to function properly, both the modem in the management console and the modem in the managed server must have the computer-to-modem port speed set to "*fixed.*" This can be configured through initialization strings in both Integrated Remote Console and the management application. See Chapter 6 and your modem's documentation for more information.

Installing the Modem

Consult the instructions for installing hardware options in the documentation that accompanied your Compaq server. Consult the user documentation that accompanied your modem for additional instructions specific to the modem, including default settings.

For internal modems, the Compaq System Configuration Utility can be used to determine the appropriate COM port and IRQ jumper settings.

Configuring the Modem

Configuring a non "plug-n-play" ISA Modem

The Compaq System Configuration Utility does not automatically detect non plug-n-play ISA devices. Therefore, you must manually account for system resources used by an installed ISA modem. To configure the modem:

1. Boot the server and run the Compaq System Configuration Utility. This utility can be run from floppies or by booting the Compaq SmartStart and Support Software CD included with your server. If you created a system partition during the initial setup of the server, you can invoke this utility by pressing the **F10** key when prompted during the server's power-on-self-test sequence.

2. Select the *System Configuration* menu option from the utilities main menu.

3. Select *Configure Hardware* from the configuration menu.

4. Select *Step 2: Add or Remove Boards* from the System Configuration main menu.

5. Press **Insert** to manually add a board to the server configuration.

6. Select *!ISA0010.CFG Generic Modem (for use with IRC)* from the list of boards that appears.
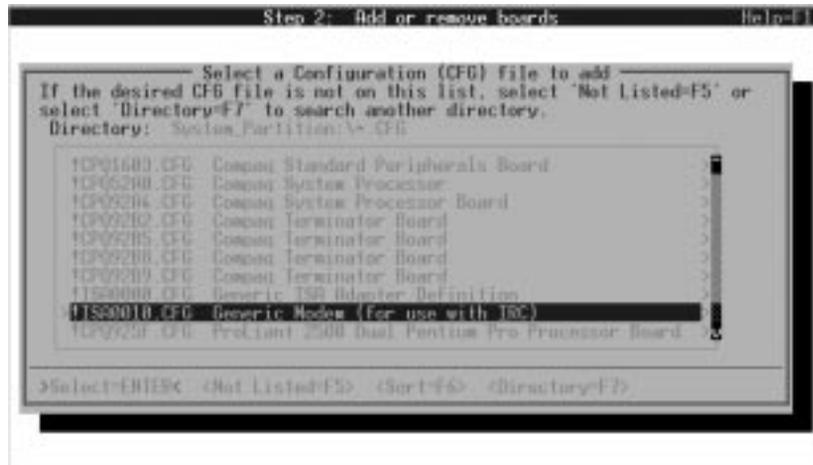
Figure 2-1.   Example: Selecting a configuration file

7. Select the slot where the modem is installed when the Configuration Utility identifies appropriate slots for the modem, then press **Enter**.

8. Press **F10** to return to the System Configuration Main Menu.

9. Select *Step 3: View or Edit Details*.

10. Set the COM and IRQ IRQ resources to match the jumper settings on the modem. Note these settings as they are needed when configuring Integrated Remote Console.

Figure 2-2.   Example: Setting the COM and IRQ resources

Configuring an external modem or direct connection

If you are using an external modem or want to connect IRC directly to another computer, terminal, or terminal server, you must first configure one of the integrated serial ports   on the managed server.

1. In the System Configuration Utility, move the selector to *Integrated Interfaces* in *Step 3: View or Edit details*. Highlight the serial port that will be connected to the external device. Either serial port can be used with Integrated Remote Console.

2. Select the desired COM port resource setting. The recommended settings are *COM1 for Serial (A)* or *COM2 for Serial (B)*.

3. Check the interrupt setting for the desired integrated serial port by selecting *Edit Resources* (**F6)** when the COM port selection is highlighted. Make sure that the configured interrupt setting is "edge" triggered.

4. Note the COM and interrupt settings for the desired integrated serial port; these are needed when configuring IRC.
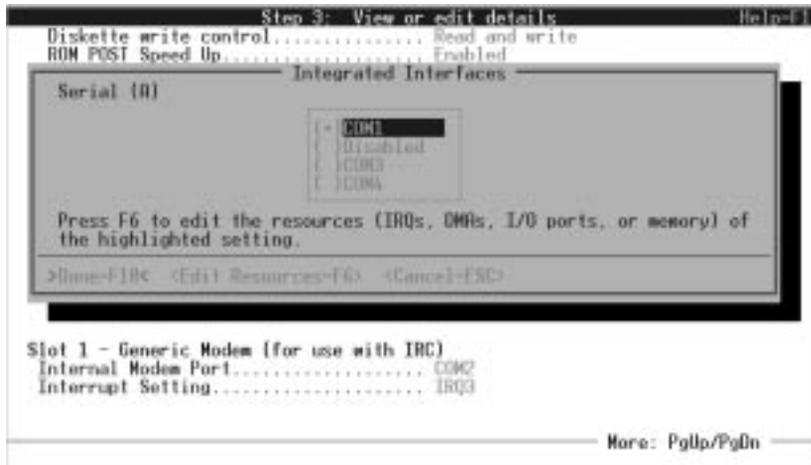
Figure 2-3.   Example: Configuring an integrated serial port
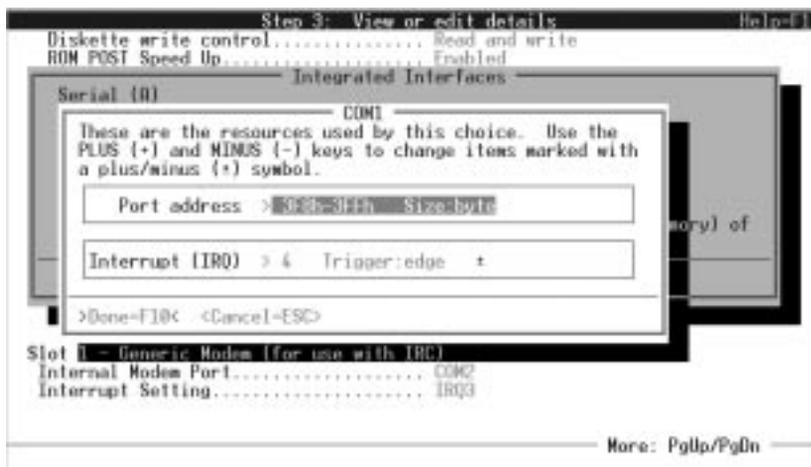
Figure 2-4.   Example: Viewing the resources of an integrated serial port

Configuring Integrated Remote Console

Use the System Configuration Utility to configure IRC. Table 2-1 summarizes the System Configuration Utility configuration options and their default values.

Table 2-1
Integrated Remote Console Configuration Summary

Parameter	Configuration Value (default settings in bold)
General Integrated Remote Console Information	
Remote Console Functions	Enabled/**Disabled**
Communication Device	External Modem/Internal Modem/Direct Connect
Keyboard	**United States**, Belgian, British, Danish, Finnish, French, French Canadian, German, Italian, Japanese, Latin American, Norwegian, Portuguese, Spanish, Swedish, Swiss French, Swiss German
Communication Settings	
COM Port	COM1, **COM2**, COM3, COM4
Interrupt (Internal Modem only)	**IRQ3**, IRQ4, IRQ5
Sharing Options	**Shared**, Dedicated
Maximum DTE Baud Rate	**19200**, 38400, 57600, 115200
Data Bits	7, **8**
Parity	**None**, Even, Odd
Stop Bits	**1**,2

Continued

Integrated Remote Console Configuration Summary *Continued*

Parameter	Configuration Value (default settings in bold)
Modem Settings (not required for direct connection)	
Initialization String (primary)	**ATZ**
Initialization String (secondary)	**AT&C1&D2**
Dial Prefix	**ATDT**
Answer String	**ATS0=1**
Security Access	
Supervisor	Yes/**no**
Remote Console	**Yes**/no
Reboot Server	**Yes**/no
Replay Boot Sequence	**Yes**/no
Force Dial-back	Yes/**no**

1.   Select Remote Console Functions from *View or edit details*, and set to *Enabled*.

Figure 2-5.   Example: Enabling Remote Console Functions

2. Set the *Keyboard* type to match the layout of the keyboard on the managed server. For proper remote keyboard operation, this setting must match the keyboard country configuration of the server's operating system.

3. Set *Communications Device* according to your hardware configuration:

    a. *Internal Modem*

    b. *External Modem* or

    c. *Direct Connect* if connecting with a null modem serial cable to another computer, terminal, or terminal server.

4. Configure the IRC modem resources. Set the COM port and interrupt setting to match the hardware jumper settings on the internal modem , or integrated serial port settings if connecting to an external device.

5. To use this modem only for the IRC feature, select *Dedicated* under *Sharing Options*.

    To use a single modem for both IRC and Asynchronous System Management, or to allow the operating system to access the modem, accept the default setting of *Shared*.

    NOTE: To use the "shared" modem setting, you must ensure that Integrated Remote Console is configured identically to the modem configuration settings of the operating system. See Chapter 8 and Appendix A for more information.

6. Configure the COM port settings. Set the baud rate to the highest reliable DTE rate for your modem. Most high-speed modems will tolerate DTE rates as high as 38,400, 57,600 or 115,200 bps. Consult the instructions supplied with the modem for the appropriate computer to modem serial port speed. This setting will be greater than or equal to the desired connection rate. The Data, Parity, and Stop   settings should be set to **8**-**None**-**1** respectively unless a 7-bit parity mode is required.

Modem Strings

Configure the Modem Command Strings (not required for direct connect):

1. Set the Primary and Secondary Initialization strings. These command strings are used to initialize the modem used by IRC.

   The Primary Initialization string must include the appropriate AT command to reset the modem to a known state. Since AT command strings can contain multiple configuration and command sub-strings, this string can also contain additional configuration commands. (For example, AT&F and AT&C1&D2 can usually be combined into one command: AT&F&C1&D2.) Not all command strings can be concatenated. For example, most modems ignore commands following the ATZ command.

   The Secondary Initialization string must include additional AT configuration commands necessary to properly configure the modem for use with IRC.

   The configuration utility sets the Primary and Secondary Initialization strings to "ATZ" and "AT&C1&D2," respectively. These strings were chosen since they generally apply to all modems. Your modem may require different strings to operate properly. These initialization strings must place the modem in the following state for proper operation with Integrated Remote Console.

   ■ Computer to modem serial port speed:computer to modem, to fixed (&B1 or \J0)

   ■ DCD serial port signal assertion to "normal" (&C1)

   ■ Modem responds correctly to DTR assertion (&D2)

   ■ Computer to modem serial port set for hardware flow control

   ■ Error correction enabled

   Additional configuration options may be necessary if you have the modem in the *shared* configuration. These settings are necessary to ensure that Integrated Remote Console and the operating system have configured the modem similarly. Additional configuration settings include:

   ■ Modem response format (numeric or verbose)

■ Modem result code options

Chapter 6 explains modem command strings in more detail. Chapter 8 provides additional information on using the modem in shared mode. Appendix A contains suggested entries for proper initialization strings for several common modems.

2. Set *Dial Prefix* to either **ATDT** (tone - default) or **ATDP** (pulse) dialing.

3. The *Answer String* should contain the command string necessary to place the modem in "auto-answer" mode. It will not accept calls if this string is not set appropriately.

The default string, ATS0=1 places a Hayes-compatible modem in auto-answer mode, answering on the first ring.

Assigning Authorized Users

Before any users can log into IRC, the system administrator must set up a valid user database. This is also performed through the System Configuration Utility.

Figure 2-6. Example: Configuring users

User Configuration

You must have at least one user configured in the database to access IRC. The maximum number of users is eight. Use the System Configuration Utility to add, delete, or modify user entries. Users can also be added, deleted, or modified online from the IRC Main Menu if the connected user has supervisor privileges.

To edit user information:

1.   Select *View or edit details* from the System Configuration Utility.

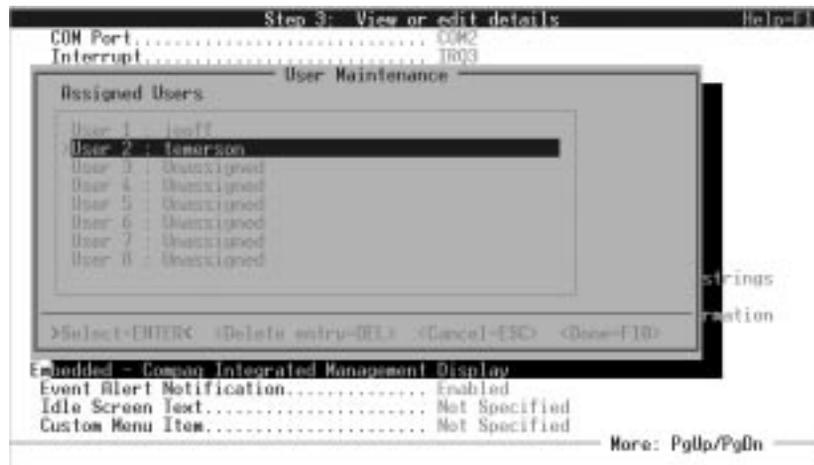2.   Highlight *Configure Users*, then press **Enter**.

Figure 2-7.   Example: Selecting a user to modify

3.   Highlight the desired user line, then press **Enter**. To add a user, simply choose one of the unassigned entries.

4. Edit the following user information:

   a. **User Name** — Case-sensitive name that must be used when logging into the Integrated Remote Console. User names can be up to 11 characters in length.

   b. **Password** — Case-sensitive password that the user must use when logging into IRC. It must contain at least four characters and no more than 15. When setting passwords, the administrator is prompted for verification.

   c. **Dial-Back Number** — If dial-back security is desired for this user, enter the user's dial-back number and enable the Dial-Back option in *Security Access*. When enabled, IRC logs the user out after successful authentication and calls the user back at this number. This prevents the user from logging in from an arbitrary location.

      When entering telephone numbers, use only the following characters: 0, 1, 2 ,3 ,4 ,5, 6, 7, 8, 9,), (, space, comma, and hyphen. Any other characters are ignored. The following are examples of valid entries:

      (713) 123-4567

      (011612) 213231234

      *70, 713-123-4567

      1265312653612536

      (73847) - 38 - 834378

5. Verify/Change the user's security settings. Position the highlight to *Security Access* and press **Enter**. Ensure the correct setting of the following security attributes:
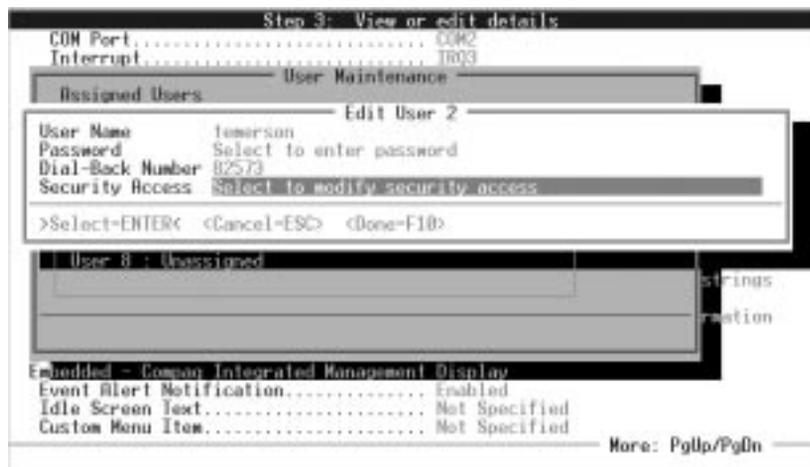

Figure 2-8.   Example: Edit User screen

a. **Supervisor Rights** — A user with supervisor rights can remotely modify all Integrated Remote Console configuration parameters, including the addition, deletion, and modification of other users. The default setting is *disabled*.

b. **Remote Console Rights** — Authenticated user has remote access to the managed server's console. Users can be assigned login access, but have no access to the server console. The default setting is *enabled*.

c. **Reboot Server Rights** — Authenticated user can remotely reboot or power-cycle the managed server. The default setting is *enabled*.

d. **Boot Sequence Replay Rights** — Authenticated user can replay boot sequences stored in the Integrated Remote Console. The default setting is *enabled*.

e. **Force Dial-back** — Integrated Remote Console logs out the user after successful authentication and calls the user back at the number specified in the Dial Back Number entry of the user's data structure. This prevents the user from logging in from an arbitrary location.
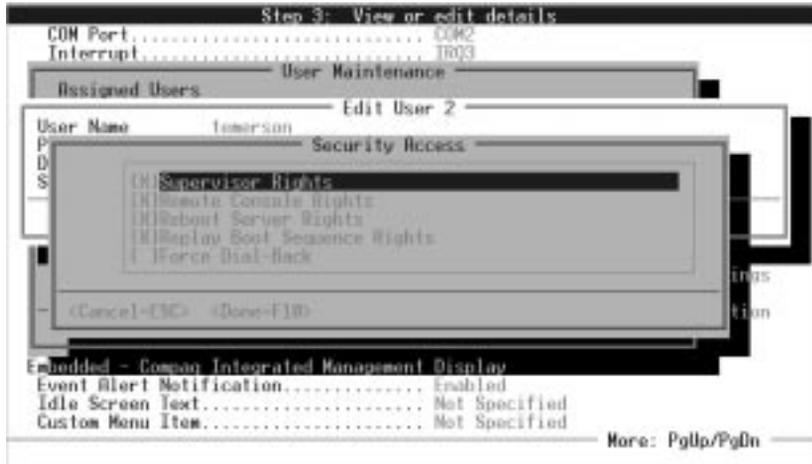

Figure 2-9.   Example: Setting Security Access

6. Press **F10** until you return to the *User Maintenance* screen.

Repeat steps 1-6 for additional users.

Chapter 3
Establishing a Connection

You can establish a connection to Integrated Remote Console (IRC) from any ANSI X3.64 compatible terminal or terminal emulator. This section contains specific information on how to establish a connection using either Compaq Insight Manager or Windows HyperTerminal. In addition, this section contains general guidelines necessary if an administrator wants to use a different terminal emulator application.

Establishing a Connection Using Compaq Insight Manager

Compaq Insight Manager is the recommended application for accessing IRC in a managed server. Although IRC is designed to be accessible from any ANSI compatible terminal, Insight Manager incorporates several keyboard and terminal extensions to make certain tasks easier from within IRC. In addition, Insight Manager combines access to the Compaq suite of remote management tools into one convenient location.

Compaq Insight Manager provides the ability to manage multiple servers either through a local area network (LAN) or a dial-up connection. In addition to providing in-band manageability to these machines, Insight Manager provides the ability to establish an out-of-band modem remote console session with any of the managed servers. Out-of-band remote console access to a server's Integrated Remote Console feature can be enabled simply by supplying Insight Manager with that server's out-of-band management phone number. Once completed, the Remote Console menu item is activated for this server and you are able to use this menu item to establish a connection with Integrated Remote Console.

To use the Insight Manager out-of-band remote console feature, both the managed server and the management console must be equipped with compatible (preferably identical) modems.

Configuring Insight Manager for
Out-of-Band Remote Console Access

To contact the IRC function of a server, there must be an entry for that server in the Insight Manager device list. If an entry already exists for this server, proceed to step #2.

1. If the server containing Integrated Remote Console is available for in-band management through a LAN connection, create an IPX or IP entry for the server using methods described in the *Compaq Insight Manager User's Guide*.

   Create a "PPP" entry if the server is accessible only via a point-to-point connection.

   This step is necessary for any server managed through Insight Manager regardless of whether out-of-band remote console access is configured or desired.

2. Right-click the server name created in step #1 from the Insight Manager Device List window to display a list of functions you can perform on the selected server.

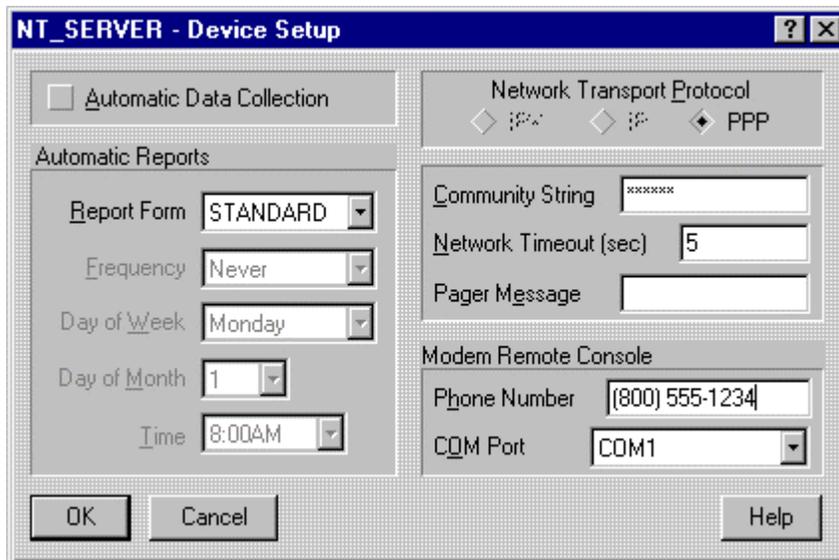3. Select *Device Setup*. The Device Setup dialog box is displayed.

Figure 3-1.   Device Setup window

4. Enter the phone number of the managed server in the Modem Remote Console configuration group.

5. Verify the COM port settings to ensure they are correct and reflect the configuration of the modem **in the management console**.

    NOTE: The COM port used for this configuration setting is based entirely upon the hardware setup of the management console and is not related in any way to the COM port setup of IRC.

6. Click **OK** to complete the configuration.

Establishing an Out-of-Band Remote Console Connection

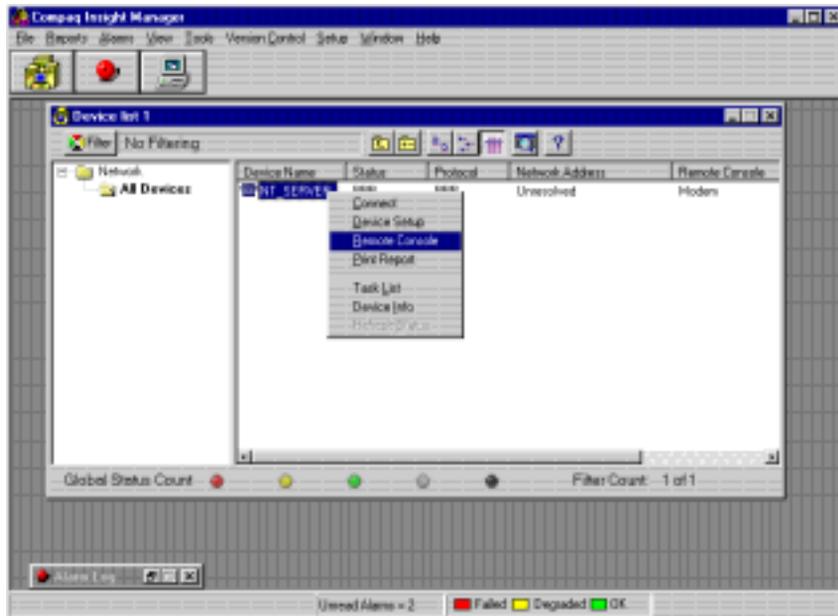Right-click the managed server in the device list to display a list of menu items, as shown in Figure 3-2.

Figure 3-2. Establishing a connection using Compaq Insight Manager

If the server is configured for out-of-band remote console access, the *Remote Console* menu option is available. Select this menu item to initiate a remote console, out-of-band session with the managed server. In certain circumstances, Insight Manager may prompt you to select between a network or modem remote console session. Select *Modem Remote Console* to access the IRC feature on the managed server.

Insight Manager launches a terminal window and dials the number configured above. The call progress is displayed in the terminal window's status bar. If configured correctly, IRC on the managed server answers the call. If the server does not answer (possibly indicating that the OS currently owns the modem), wait 60 seconds and try again. For more troubleshooting information, see Appendix C.

Invoke Integrated Remote Console Login

When Insight Manager indicates that the connection is established ("Connected" is displayed in the terminal status window), press **Enter** three times. This tells the managed server that the incoming call is intended for Integrated Remote Console.

> **IMPORTANT:** After connection has been established, you have 10 seconds to press the ENTER key three times to validate the call. Pressing any other key combination or pressing the correct key combination after the 10-second interval causes the call to be forwarded to the OS and does not invoke IRC. If this occurs and modem sharing is enabled, IRC is unavailable for at least 60 seconds following the failed login attempt. Wait 60 seconds and try again.

After the login is successfully invoked, see the section "Login" later in this chapter.

Benefits of Using Insight Manager to Establish the Connection

One of the benefits of accessing IRC through Insight Manager is enhanced keyboard support. Certain key sequences, like the function and **Alt** keys, are not available through strict ANSI emulation. These key sequences are necessary to perform certain remote server operations. (Pressing **F10** to invoke system partition utilities, for example). If IRC detects Insight Manager is the control application, many of these key sequences are directly supported and do not require attention sequences. See chapter 4 for the enhanced key sequences available directly through Insight Manager.

In addition to enhanced keyboard support, Insight Manager also offers enhanced display support. If the server console changes to a different display mode, this change is automatically updated in the Insight Manager terminal window. This is particularly useful when managing a Microsoft NT server, which changes from 25-line to 50-line text modes during the OS load process.

An additional feature is the **Switch Consoles** button, which appears below the status bar in the terminal window. This button conveniently switches between the Remote Console mode and the Integrated Remote Console main menu.

Verifying Modem Settings

A majority of IRC connection problems are actually caused by improper configuration of the modem on the management console. For consistent and reliable out-of-band connections to IRC, the modem in the management console must be configured as follows:

■   Computer to modem serial port speed to "*fixed*" (&B1 or \J0)

■   DCD serial port signal assertion to "*normal*" (&C1)

■   Modem responds correctly to DTR assertion (&D2)

■   Computer to modem serial port set for "*hardware flow control*"

■   Error correction "*enabled*"

Chapter 6 contains additional information on the settings listed above. If you are having trouble connecting to the Integrated Remote Console feature on a managed server, particularly if a connection is established but you are unable to obtain a login prompt, check the modem initialization strings within Compaq Insight Manager. To verify or modify the out-of-band modem initialization strings:

1.   Select **Setup →COM Ports…** from within Insight Manager.

2.   Click **Setup** next to the COM port used for out-of-band access.
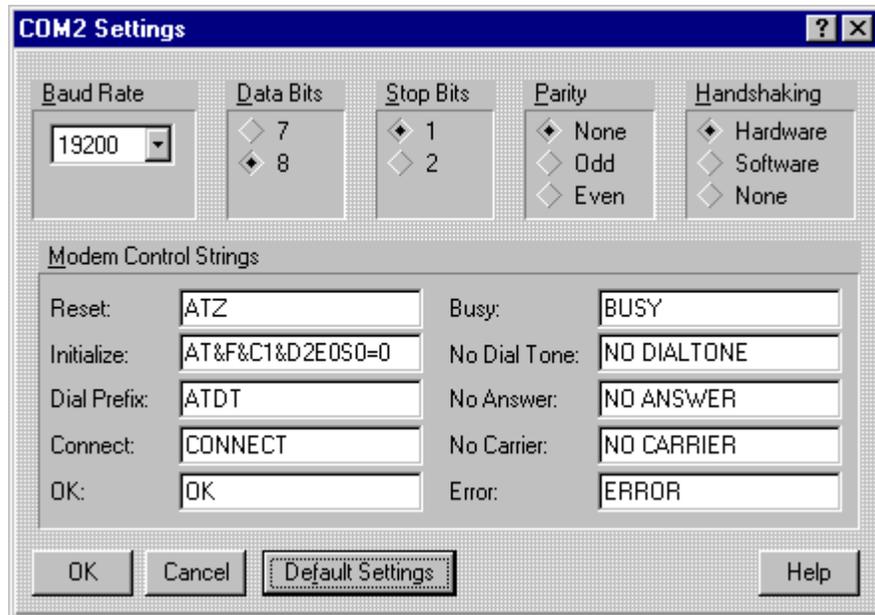
Figure 3-3.　COM port settings

3.　The COM port settings dialog box is displayed. The modem
initialization string for out-of-band access on the management console is
listed in the Modem Control Strings control group. The default value is
"AT&F&C1&D2E0S0=0". Additional configuration settings may need
to be appended to this string (for example, some modems may require
appending an &B1 (set computer-to-modem speed to fixed) resulting in
a string like "AT&F&C1&D2E0S0=0&B1"). To finish configuration,
click **OK**.

Establishing a Connection Using Windows HyperTerminal

HyperTerminal is a terminal emulation application generally available on any Windows-based management console. Since it supports ANSI terminal emulation and is a standard part of Microsoft Windows 95 and Windows NT, it serves as a good example of how an administrator could manage an Integrated Remote Console-based server from a standard ANSI terminal. Although the following information is specific to HyperTerminal, many of the concepts apply to other terminal emulation applications.

There are some limitations if you are not connecting to Integrated Remote Console through Compaq Insight Manager. Limitations specific to the HyperTerminal application include:

■ Server video is limited to 24 lines — The terminal size for ANSI emulation within HyperTerminal is 24 lines and is <u>not</u> configurable. As a result, Integrated Remote Console can only display the first 24 lines of server video, regardless of the video mode currently displayed on the server. Be sure to set the terminal size within Integrated Remote Console to 24 lines for remote console video to be drawn correctly.

■ Must use attention sequence [**Atn**] **Esc** to return to the IRC main menu from remote console mode.

■ Must use attention key sequences to generate the following key sequences to the server:

❏ function keys (**F1**-**F12**)

❏ ALT- keys (**ALT**-**F**, and so on)

❏ Editing keys (**Insert**, **Delete**, **Home**, **End**, **Page Up**, **Page Down**)

NOTE: See Chapter 5 for more information on attention key sequences.

■ No auto-answer support — Must manually enter modem commands in the terminal window to take advantage of call back.

> **IMPORTANT:** Make sure your IRC firmware revision revision is 1.41 or greater if you wish to use HyperTerminal to connect to IRC. In certain circumstances, HyperTerminal may not accurately transmit characters until is has received characters from the remote system. Consequently, the **Enter**, **Enter**, **Enter** sequence may not be correctly sent by HyperTerminal, even though it was typed correctly by the administrator. If IRC receives any characters other than the three carriage return sequence, it rejects the call and does not display the login prompt. IRC Firmware revisions 1.41 or greater automatically detect this condition to work-around the HyperTerminal anomaly. To update your IRC firmware, obtain the latest ROMPaq ROM update for your server.

Setting up a Connection

To access IRC from within HyperTerminal, you must first create a "connection file." This file contains the phone number and session-specific settings, which can be used for future connections.

To create a connection file:

1. Select New Connection from the File menu. The initial dialog box, shown in Figure 3-4, prompts you for a name for the connection file.
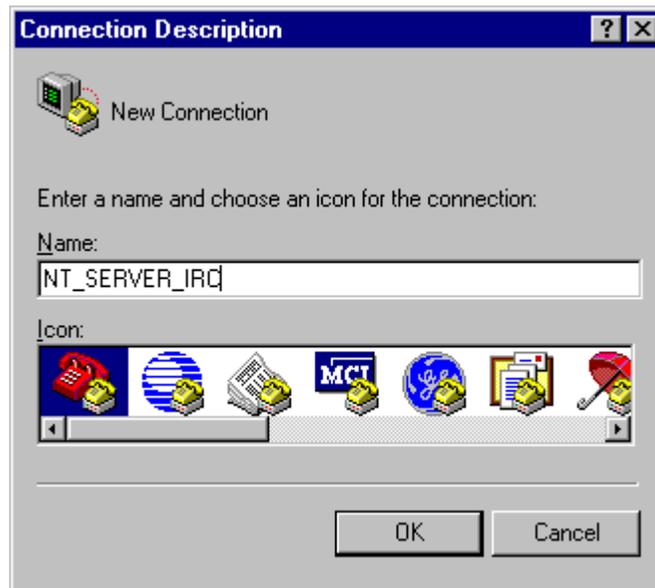

Figure 3-4.   Entering a connection file name

2. Enter a name that describes the managed server, then click **OK**.

3. Enter the server phone number. Also verify that the modem identified under "Connect using:" correctly describes the modem in the management console, then click **OK**.

Figure 3-5.   Entering connection details

HyperTerminal is now ready to dial into the managed server.

4. Verify that HyperTerminal has the correct phone number, complete with any prefix codes that may be required to access outside lines or long distance services. Use **Modify…** and **Dialing Properties…** to make any corrections.
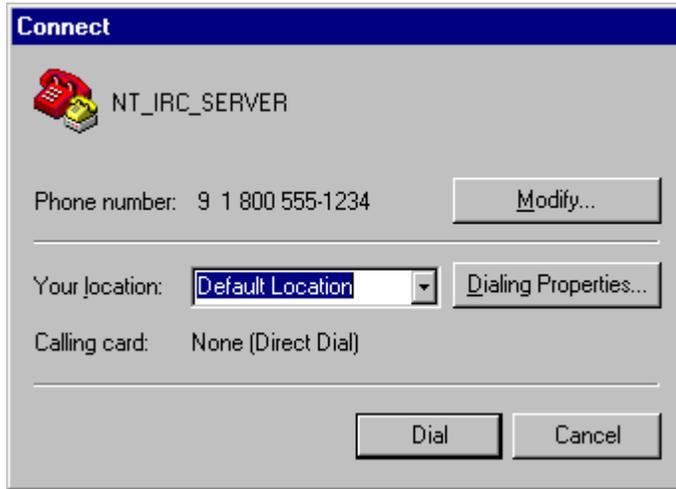

Figure 3-6.   Connection window

5. After verifying the phone number, click **Dial**. You should be prompted with a status dialog box and hear the modem establishing connection with the managed server.
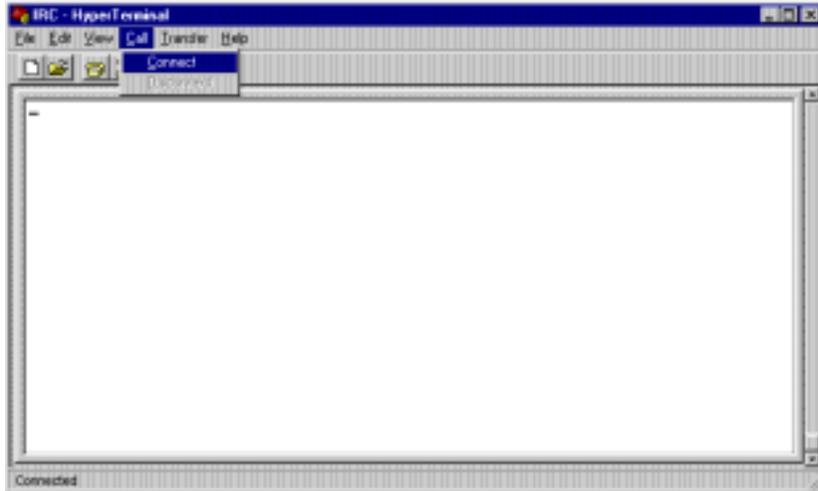

Figure 3-7. Establish a connection using HyperTerminal

The HyperTerminal application should indicate that a call is in progress. If configured correctly, IRC answers the call. If the server does not answer answer (possibly indicating that the OS currently owns the modem), wait 60 seconds and try again. For more troubleshooting information, see Appendix C.

Upon connection, the status dialog box closes and returns you to the terminal window. Notice that the status bar of the terminal window indicates "Connected."

Invoke Integrated Remote Console Login

After HyperTerminal establishes a connection, press **Enter** three times. This indicates that the incoming call is intended for Integrated Remote Console.

> **IMPORTANT:** After connection has been established, you have 10 seconds to press **Enter** three times to validate the call. Pressing any other key combination or pressing the correct key combination after the 10-second interval will cause the call to be forwarded to the OS and will not invoke Integrated Remote Console. If this occurs and modem sharing is enabled, IRC is unavailable for at least 60 seconds following the failed login attempt. Wait 60 seconds and try again.

After the login is successfully invoked, see the section "Login" later in this chapter.

Saving a Connection

After verifying the connection information, select **File → Save** so that future Remote Console sessions can be invoked by selecting **File →Open**, or by simply clicking the saved *name.ht* file from Windows Explorer.

Establishing a Connection Using an ANSI Compatible Terminal Emulator

The ANSI terminal standard allows access to IRC from most standard terminal emulation applications.

Configuration Guidelines

The following are general guidelines for using ANSI terminal emulation programs to access Remote Console.

Display Settings

Display font — If the display font of your terminal application can be configured, choose a font that supports the OEM (Original Equipment Manufacturer) character set. The "terminal" font is usually a good choice. If your terminal application is configured for a non-OEM-based font, some of the graphic line-draw characters used in the Remote Console menu system may not be drawn correctly.

Terminal settings

Terminal Size — If the terminal size of your terminal application is configurable, set it to the maximum number of lines to be displayed on the server console. For Netware and Unix applications, 25 lines is the appropriate setting to ensure that all lines on the server console are visible on the remote terminal. Windows NT, however, switches to a 50-line mode during OS load and during "blue-screen" error conditions. To insure that this information is also visible on the terminal, set the terminal size to 50 lines. The terminal size setting within Integrated Remote Console must be set to match the setting of your terminal application to function correctly.

■ Line Wrap — Make sure your terminal application is configured to wrap lines that exceed terminal width. This is the default in most terminal applications.

■ Backspace key mapping — Some terminal applications allow the backspace key to either be mapped to Backspace (**Ctrl**+**H**) or **Delete**. Make sure that Backspace is mapped to **Ctrl**+**H** and not **Delete**.

■   Screen Scroll — Make sure that screen scroll is enabled. Again, this is the default in most terminal applications.

Modem settings

A majority of IRC connection problems are actually caused by improper configuration of the modem on the management console. If your terminal emulation application supports TAPI (like HyperTerminal), the application should configure the modem correctly using information in the Windows modem database. If your terminal emulation application directly accesses the modem in the management console, make sure the modem initialization strings in the management console place the modem in the following state:

■   Computer to modem serial port speed to "*fixed*" (&B1 or \J0)

■   DCD serial port signal assertion to "*normal*" (&C1)

■   Modem responds correctly to DTR assertion (&D2)

■   Computer to modem serial port set for "*hardware flow control*"

■   Error correction "*enabled*"

Chapter 6 contains additional information on the settings listed above.

Limitations

Many aspects of IRC accommodate any ANSI terminal emulation application. There are, however, some limitations to be aware of when operating IRC from these applications. These include:

■   Screen Size — The screen size of the terminal window must be manually configured in both the terminal application and IRC.

■   Keyboard Support — Attention key sequences will usually need to be used to simulate keystrokes for the function, **Alt**, arrow, and editing keys (**Page Up**, **Page Down**, **Home**, **End**, **Insert**, **Delete**).

3-17

■ Callback Support — You need to manually place the modem in auto-answer mode if either of the following situations occur:

❏ callback authentication is required to complete your login

❏ you want IRC to automatically reestablish a connection following a remote power cycle

Establishing a Connection

After verifying the proper configuration of the terminal emulator settings, instruct the application to dial into the managed server. The terminal emulator application should indicate that a call is in progress. If configured correctly, IRC answers the call. If the server does not answer (possibly indicating that the OS currently owns the modem), wait 60 seconds and try again. For more troubleshooting information, see Appendix C.

Invoke IRC Login

When the terminal emulator verifies that the connection is established, press **Enter** three times. This action indicates that the incoming call is intended for IRC.

> **IMPORTANT:** After connection has been established, you have 10 seconds to press **Enter** three times to validate the call. Pressing any other key combination or pressing the correct key combination after the 10-second interval causes the call to be forwarded to the OS and does not invoke IRC. If this occurs and modem sharing is enabled, IRC is unavailable for at least 60 seconds following the failed login attempt. Wait 60 seconds and try again.

Login

After a connection has been established using one of the management applications described above, and the call has been validated by pressing **Enter** three times, IRC responds by displaying a login prompt, as shown in Figure 3-8.
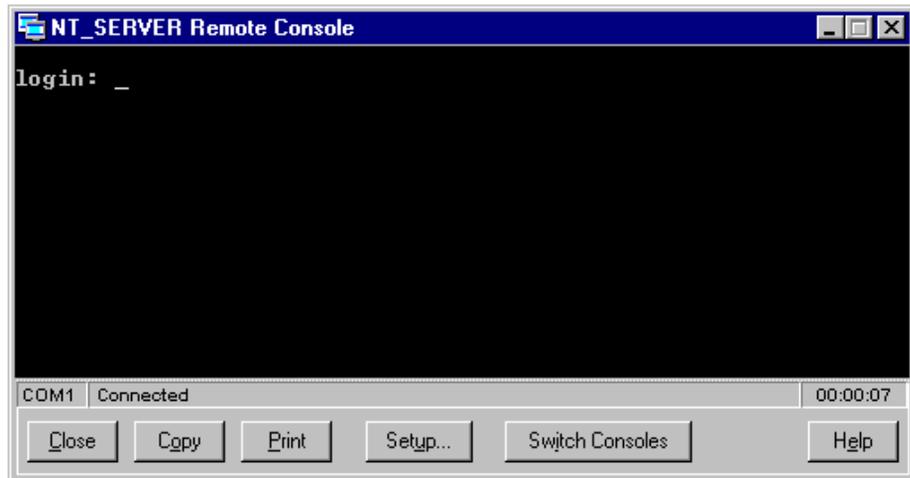

Figure 3-8.   Remote Console displays login prompt after successful call identification

To log in to IRC:

1.   Enter a valid username, then press **Enter**.

2.   Enter a valid password, then press **Enter**.

If dial-back security is not turned on for your login and you have entered a valid username and password, you are successfully logged into the Integrated Remote Console application.

If you established your connection using any standard terminal emulation program that supports ANSI, the Integrated Remote Console application main menu displays as shown in Figure 3-9 after you have successfully logged in.
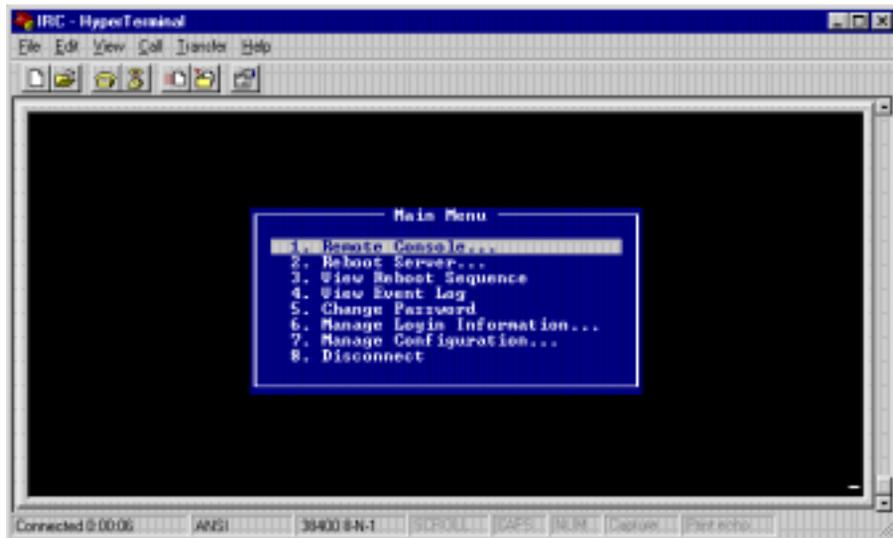
Figure 3-9.   Remote Console Main Menu

If you established your connection with Insight Manager through the *Remote Console* menu option, Insight Manager automatically switches you into Remote Console mode following login, as shown in Figure 3-10. To return to the main menu, simply click **Switch Consoles**, located at the bottom of the Insight Manager terminal window.
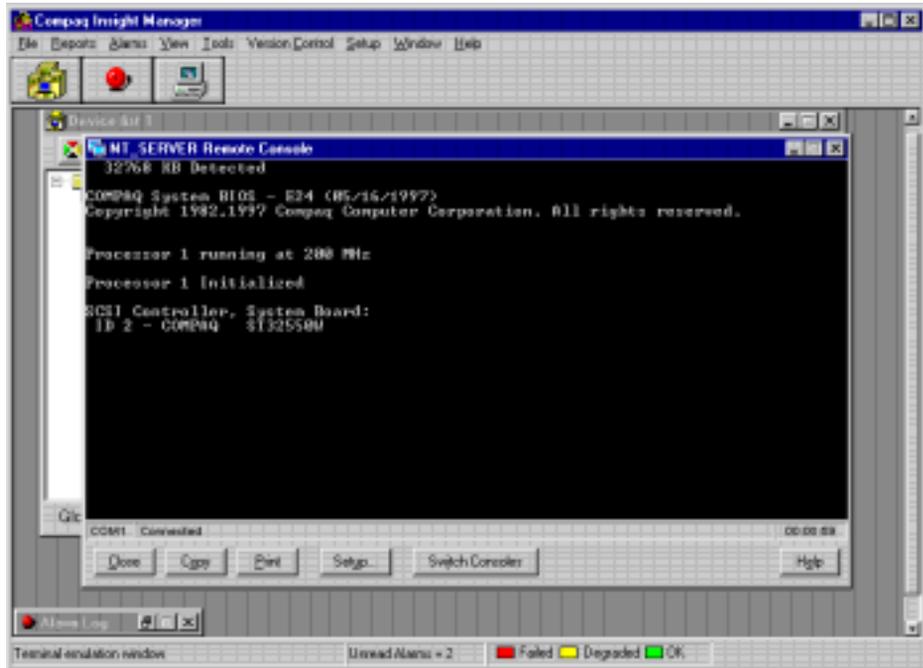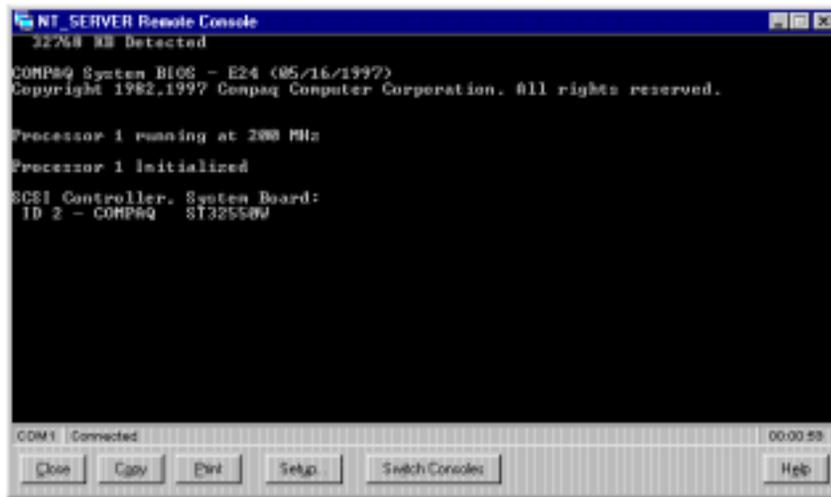

Figure 3-10.   Remote Console mode

The Remote Console main menu, as shown in Figure 3-9, is the main control center for the various functions available through IRC. See Chapter 4 for information on using the functions of Remote Console.

Chapter 4
Using Integrated Remote Console

Use the instructions in Chapter 3 to establish a connection to the managed server and to log in to Integrated Remote Console (IRC).

If you establish your connection using an application other than Compaq Insight Manager, the Integrated Remote Console Main Menu displays, as shown in Figure 4-1, after you have successfully logged in.
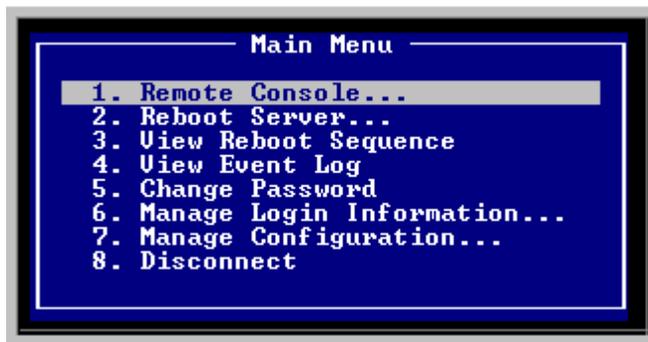
Figure 4-1.   Remote Console Main Menu

The Main Menu is the main control center for the various functions available through IRC.

If you establish your connection through the "Remote Console" menu option within Insight Manager, you are automatically switched into Remote Console mode following login, as shown in Figure 4-2. To return to the Main Menu, simply click **Switch Consoles**, located at the bottom of the Insight Manager terminal window.

Figure 4-2. Remote Console mode

Main Menu Options

The following options are available from the Main Menu.

- **Remote Console** — Redirects the managed server's console to the management console to provide the user with remote control capabilities, regardless of the software running on the managed server.

- **Reboot Server** — Lets you reset the managed server. Use this only as a last resort; it performs an unconditional reset of the server.

- **View Reboot Sequence** -— Lets you view all recorded video activity following an Automatic Server Recovery (ASR) event. This includes all ROM POST messages and operating system load information.

- **View Event Log** — Lets you examine the IRC event log.

- **Change Password** — Lets users without supervisory access modify their login password.

- **Manage Login Information** — Lets a user with supervisory access add or delete users or modify an existing user's configuration.

- **Manage Configuration** — Lets an administrator remotely change the configuration parameters of Integrated Remote Console.

- **Disconnect** — Lets the user terminate the connection with IRC.

This chapter discusses each of the menu options in the order listed above.

Remote Console Menu Option

One of the primary control features offered by IRC is its ability to allow a user remote access to the managed server's console.

Enter remote console mode by selecting *Remote Console…* from the Main Menu. This can be done by positioning the cursor, then pressing **Enter**. If your terminal emulation program supports arrow keys (as does Insight Manager and HyperTerminal), the UP and DOWN arrow keys can be used to move the highlight bar to the various items available from this menu. If your application does not support the arrow keys, the **I** and **M** keys can be used to perform this function. See Table 4-1 for more information about navigating from within Integrated Remote Console. After selecting *Remote Console…* from the main menu, the Remote Console submenu is displayed as shown in Figure 4-3. This menu allows you to:

■ Begin a Remote Console Session

■ Change the default attention key

■ Change the terminal screen size

■ Return to the Main Menu

Figure 4-3.   Remote Console submenu

Beginning a Remote Console Session

If the attention key and terminal size settings are correct, select *Begin a Remote Console Session* to enter the Remote Console mode. The managed server console is displayed if the following conditions are met:

■   The user has remote console access to the server.

■   The managed server is in text mode. If the managed server is in graphics mode, an appropriate message is displayed.

In this mode, characters typed into the terminal emulation window are redirected to the managed server. Figure 4-4 shows an example of remote console mode. In this example, the server is running the Windows NT operating system and is currently waiting for input at the initial OS Loader.
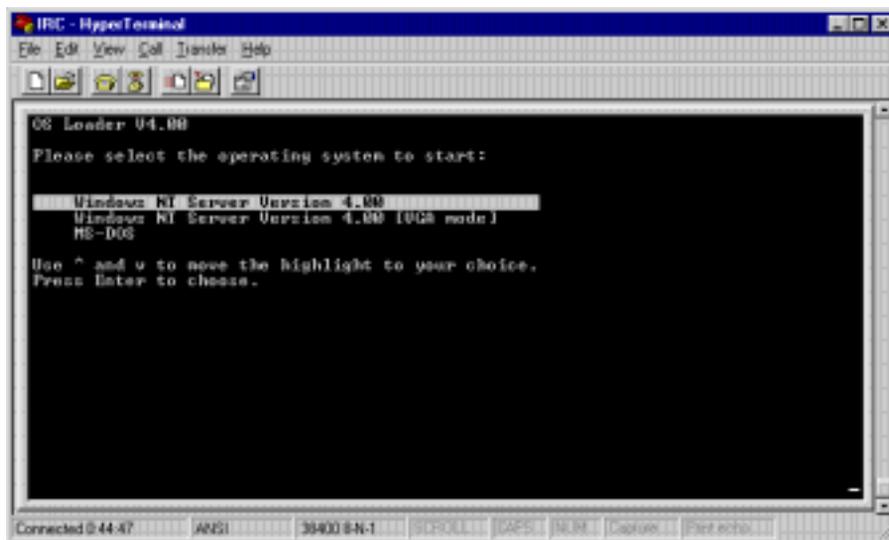
Figure 4-4.   Using Remote Console mode

In this example, the arrow keys can be used to move the selector to the appropriate operating system choice. Again, if your terminal emulator supports arrow keys (true for Insight Manager and HyperTerminal), you can move the selector bar using these keys, as you would at the server console.

Table 4-1
Key Functions for Navigating the IRC Menu System

Key	Function
1-**9**	Moves and selects the corresponding menu item
↑ or **I**	Scrolls the highlighted selection up. The "I" key can be used to navigate the menus from ANSI terminal programs that do not support the up and down arrow keys.
↓ or **M**	Scrolls the highlighted selection down. The "M" key can be used to navigate the menus from ANSI terminal programs that do not support the up and down arrow keys.
Tab	Moves to the next selection.
[Atn] Esc	Exits the Remote Console session. This is a two-key sequence performed by first pressing the user-definable attention key and then pressing the Esc key. See Chapter 5 for more information on entering attention key sequences.
Enter	Displays the next level menu, detail information for a selected item, or terminates editing and accepts changes.
Esc	Cancels the current event and returns to the previous screen. A confirmation message is displayed to verify that you have saved any changes.
Page Up or **O**	Displays the previous page.
Page Down or **,** (comma)	Displays the next page.
Space	Toggles between two options.
Home or **U**	Returns to the top.
End or **N**	Moves to the bottom.

If your terminal emulator does not support the arrow keys, you can still generate these keys by using attention key sequences (described in detail in Chapter 5). The attention key sequence for generating the up and down arrow keys in Remote Console mode is [**Atn**]**I** and [**Atn**]**M** respectively. For this example, the attention key method is used to move the selector to the "MS-DOS" entry.

In this example, the attention key is defined to its default: **Ctrl**+**A**. To perform a down-arrow attention key sequence:

1. Hold the **Ctrl** key down while pressing the **A** key on the terminal keyboard.

2. Release both keys making sure to release the **Ctrl** key last. This informs IRC that you want to generate an enhanced key sequence. There is no change to the server console, since Remote Console is waiting for the next key to complete the sequence.

3. Press the **M** key. The down-arrow key sequence is complete.

Since the **M** key was preceded by the attention key [**Ctrl** + **A**], IRC presses the down-arrow key on the managed server's keyboard. The **M** key used to complete the attention sequence is not case sensitive.

> **NOTE**:   Remote Console interprets the character sequence the same regardless of the state of the CAPS LOCK key on the terminal emulator keyboard.

Keep in mind that your are actually composing this character sequence by entering two distinct characters: first the [**Ctrl**+**A**] and then the **M**. It is incorrect, for example, to hold down all three keys (**Ctrl**+**A**+**M**) at the same time. If you have entered this sequence correctly, Remote Console generates a down-arrow to the managed server, which moves the highlight down one entry. You can move the highlight down one more entry by repeating the above sequence.

The terminal emulator interactively displays any changes to the server console as they are typed, as shown in Figure 4-5.
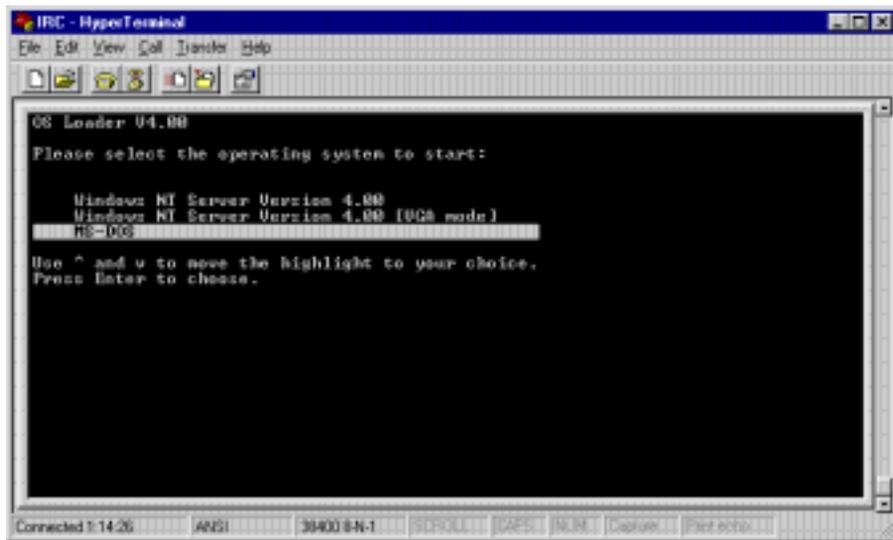
Figure 4-5.   Selecting MS DOS as the operating system

Press **Enter** to select the operating system.

Returning to the Main Menu

To return to the Main Menu from remote console mode, you must enter an attention key sequence to distinguish this command from keys that might be valid or desired for server control. The attention key sequence to return to the Main Menu is [**Atn**] **Esc**. This is done by entering the attention key as described in the down-arrow example, followed by **Esc**. The same rules apply. That is, the sequence consists of **Ctrl**+**A** followed by **Esc**. It is incorrect to press all three keys at the same time. Successful entry of this character sequence returns you to the Main Menu.

If you are using Compaq Insight Manager as the terminal emulation application, the process of switching between the main menu and remote console mode is greatly simplified by the **Switch Consoles** button, located at the bottom of the terminal emulation window. Click this button to toggle between the two modes and bypass the Remote Console submenu.

In addition to the Switch Consoles feature, Insight Manager offers enhanced keyboard and terminal support. As a result, the function keys (**F1**-**F12**) and **Alt** sequences can be performed on the terminal console, without having to use attention sequences. In addition, the Insight Manager terminal window dynamically resizes itself to match the screen size of the server console. Windows NT, for example, changes between 25-line and 50-line mode during its boot process.

Note that your ability to control the server is not dependent upon any special software running on the server, nor it is restricted to when the managed server is in a particular state (like running BIOS). This allows you to inspect and control the server between operating system transitions or when the server is completely off line.

Changing the Default Attention Key

The attention key is important since it must be used to exit from remote console mode and return to the Main Menu. Be sure to note the currently defined attention key before entering Remote Console mode. Figure 4-3 illustrates the default attention key setting of **Ctrl** + **A**.

The Change Attention Key menu option lets you modify the key that is used to generate unavailable key sequences and special command sequences from standard ANSI terminal emulation programs.

When the Change Attention Key menu option is selected, IRC prompts you to enter a new attention key. A screen similar to Figure 4-6 is displayed.
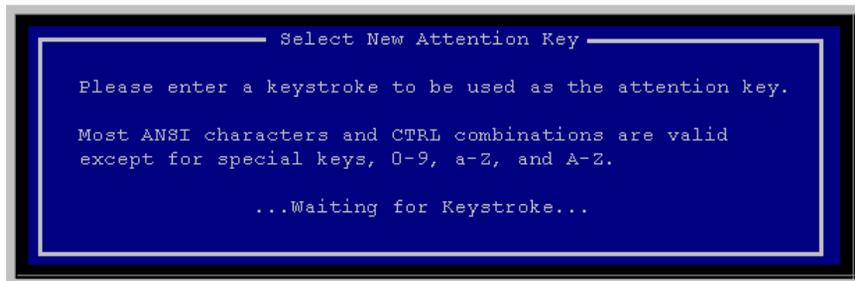
Figure 4-6.   Change Attention Key screen

The default attention key for a new user is **Ctrl** + **A**. If a user modifies the attention key, the modified value is saved in the user database. Different users can use different attention keys.

An attention key may be any ASCII key, preferably a key that is infrequently used. For this reason, numbers and upper and lower case numbers are not allowed to be assigned as the attention key.

See Chapter 5 for a complete listing of attention key sequences.

Changing the Terminal Screen Size

This option allows you to accurately view the server console from the remote terminal program. Users accessing IRC from Compaq Insight Manager do not need to change this setting, since Insight Manager's terminal window automatically adjusts to the correct number of lines as the server changes video modes.

For proper operation, this setting must match the number of lines currently displayed by the remote user's ANSI terminal. Most standard ANSI terminal emulation packages, like HyperTerminal, default to a screen size of 80 columns by 24 rows. This mode can be accommodated by IRC by changing the terminal size setting to 24 rows. However, since the server display usually contains at least 25 rows, all rows which extend beyond the terminal size setting are shortened.

Most of the more advanced ANSI terminal emulation packages allow adjustment of the number of displayed rows. If this is the case, it is recommended that both the remote terminal and the terminal size settings be adjusted to accommodate the maximum number of lines which will usually be displayed on the server console. For instance, if the managed server operating system is Windows NT, the recommended terminal size is 50 lines, since Windows NT uses this video mode during operation system load and during "blue screen" trap conditions. If both the terminal emulation application and IRC are configured for more lines than are currently being displayed on the managed server, IRC adjusts the output so it is correctly displayed on the Management Console. This allows you to use one terminal size setting for all display modes.

If you are using a terminal emulation package that supports 25 lines, make sure that the terminal application is correctly configured for 25 lines. If the terminal emulation package does not support 25 lines (like HyperTerminal), IRC must be configured to match this limitation. In either case, the terminal size setting in IRC and the terminal emulation application must match for correct display. IRC saves this setting in your user profile, so changes to the terminal size are retained between sessions. If the terminal size requires adjustment, select the "Change Terminal Size" option from the Remote Console submenu. Adjust the terminal size to either 24, 25, 43, or 50 lines.

Return to Main Menu

You can return to the IRC Main Menu by pressing **Esc** or selecting this option.

Reboot Server Menu Option

It may become necessary to reboot a server that has gone off line and is no longer accessible through the OS. Compaq Automatic Server Recovery can be configured to reboot the server automatically when this condition is determined. In some instances, however, the administrator may want to control this reset event so that it can be interactively invoked and monitored.

For this example, a catastrophic error was intentionally introduced in the Windows NT operating system. This server is no longer available through OS-based tools since the operating system is off line. If this server is equipped with IRC, it is still accessible and can be rebooted remotely.

To establish a connection with IRC in this server, use the steps described in Chapter 3. Upon entering Remote Console mode, notice that the operating system is currently off line and is displaying valuable information about the failure, as shown in Figure 4-7.

Figure 4-7.   Example of a failure situation

This debug information can be easily captured for later analysis by using the Copy to Clipboard function of the terminal emulator application. In Insight Manager this can be done by clicking **Copy**, located at the bottom of the terminal window.

From visual inspection of the server console, you can see that the operating system is off line. To restore this server to an online state, it must rebooted. This can be done by returning to the Main Menu and selecting the *Reboot Server...* menu option.

To return to the Main Menu, press the **[Atn] Esc** sequence, described earlier in this chapter. If you are using the terminal window from within Insight Manager, click **Switch Consoles**.

After switching to the Main Menu, select *Reboot Server....* This invokes the Reboot Server submenu shown in Figure 4-8.
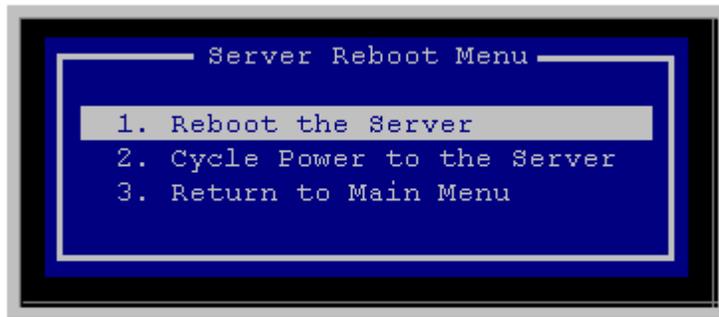
Figure 4-8.   Server Reboot menu

From this menu, you can reboot the server in one of two ways:

■   Perform a low-level reset of the server and all connected peripherals. This is the same type of reset that occurs following an Automatic Server Recovery event. Although the server itself is reset, you remain connected and can monitor the reboot process from within Remote Console mode.

■   *Cycle Power to the Server* is available on servers that support this feature. Since both Remote Console and the modem rely on server power to function, you cannot remain connected to the server through this type of reset. However, Remote Console can be configured to automatically reestablish the connection when power returns.

In this example, the server is reset by selecting *Reboot Server....* Remote Console prompts you for verification, since this unconditionally resets the server.

Figure 4-9.   Reboot Server warning

Press **Y** to begin the server reboot process. Following the server reset event, Remote Console automatically places you in Remote Console mode so that you can interactively monitor the reset process. After several seconds, the server initializes its video controller, and you see the power-on-self-test (POST) messages of the server's reboot process. Note that in this mode, you can control the reset flow by entering commands at the terminal keyboard. These are interpreted in the same way as commands entered at the server console. This allows you to run diagnostics or pause the reset process to inspect possible error messages.

You may choose to perform the *Complete Power Cycle* option for the *Reboot Server* submenu. Since both IRC and the modem will lose power, IRC asks you if you want to be called back when the power returns. A screen similar to Figure 4-10 is displayed.
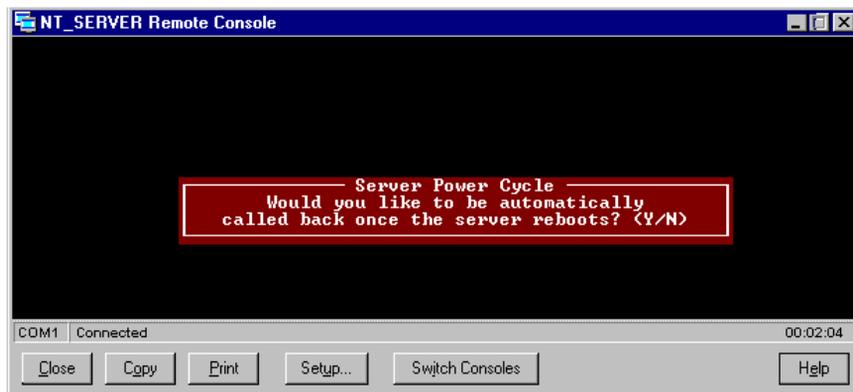
Figure 4-10.   Power Cycle warning

Type **Y** to instruct Remote Console to attempt to automatically reestablish the connection upon power-up. Integrated Remote Console prompts for the phone number of the management console. After entering the phone number of the management console, you are prompted for verification one last time. Type **Y** to initiate the remote server power down sequence.
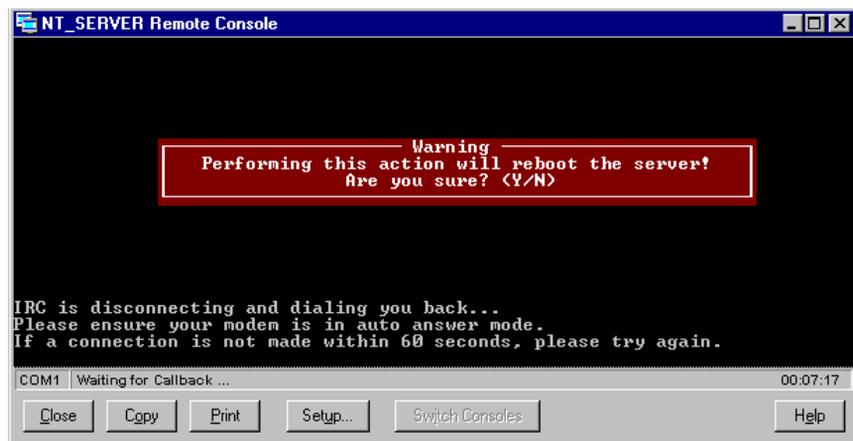

Figure 4-11.   Power Cycle dial back

If you are using Insight Manager as the terminal application, as shown in Figure 4-11, the reconnection is reestablished without user intervention. The Insight Manager terminal window is placed into "Callback mode", indicated by the phrase "Waiting for Callback…" located in the status window. When power returns to the server, Remote Console uses the supplied phone number to attempt to reestablish a connection. Insight Manager answers the incoming call and redisplays the Main Menu.

If you are using a standard ANSI terminal emulation application, like Windows HyperTerminal, the method for putting the modem in auto-answer mode varies. Some applications, like HyperTerminal, do not provide for answering incoming calls. The modem can be manually placed in auto-answer mode by entering the modem auto answer string (usually "ATS0=1") followed by **Enter**. The modem responds by displaying "OK" in the terminal window. The modem answers the incoming call from Remote Console.

> **NOTE**: Insight Manager is the recommended management application if this functionality is desired.
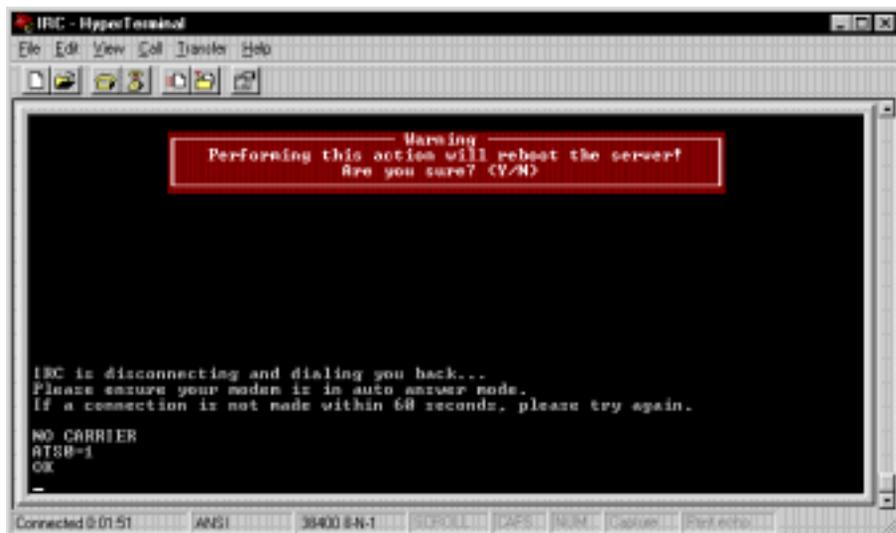

Figure 4-12.   Power Cycle using ANSI terminal emulation emulation

View Reboot Sequence

Selecting the View Reboot Sequence option from the IRC Main Menu lets you view a stored boot sequence. The IRC boot sequence recorder starts automatically following an Automatic Server Recovery (ASR) event. The boot sequence contains all ROM POST messages and operating system load messages that were displayed on the managed server console while it was being rebooted. If the Compaq Health Driver for your particular operating system is loaded, this sequence will also include a snapshot of the server console at the time the ASR event occurred. Boot sequences are stored in system memory and are not available once the server power has been deactivated.

When the boot sequence recorder is activated, all text-mode video data is collected until the boot sequence recorder is full or the recorder duration timer expires (approximately five minutes). The recorder duration timer insures that even the minimal overhead necessary to sustain the boot sequence recorder will not affect server performance.

If IRC contains a valid boot sequence, the View Reboot Sequence menu option is available. If this menu option is gray or inactive, there is no boot sequence to view. Select View Reboot Sequence from the Main Menu to display a screen similar to Figure 4-13, showing the commands that control sequence playback.
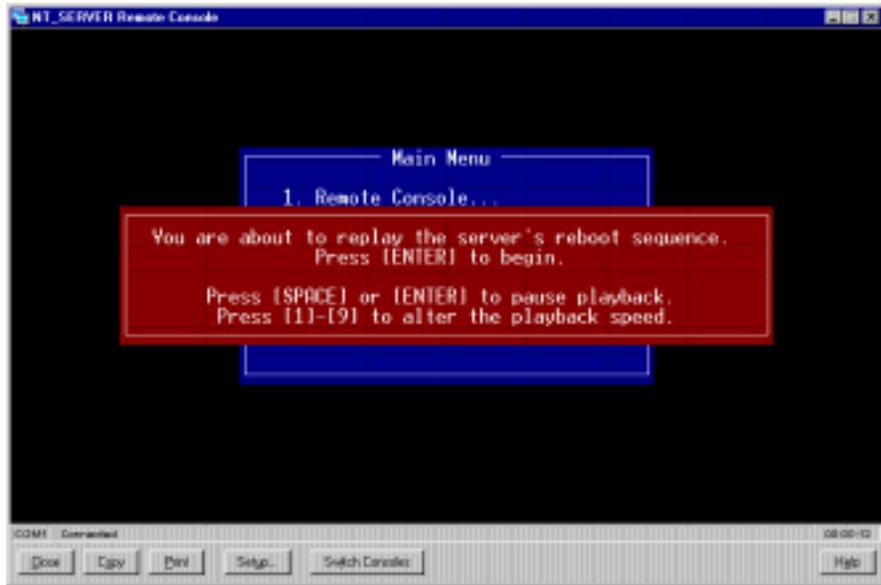
Figure 4-13.   Reboot Replay Sequence screen

You can adjust the playback speed using keys **1**-**9**. The space bar can be used to stop/start the playback. After the sequence has been played, you are returned to the main menu. Pressing **Esc** terminates the sequence replay and immediately returns you to the main menu.

View Event Log

Select *View Event Log* from the Main Menu to view the IRC Event Log, as shown in Figure 4-14.
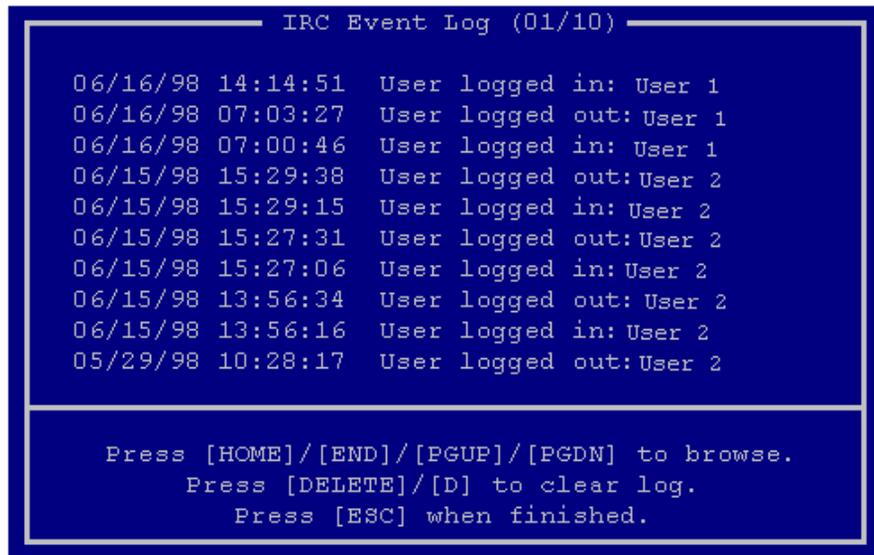
```
╒══════════════ IRC Event Log (01/10) ══════════════╕
│┌──────────────────────────────────────────────────┐│
││ 06/16/98 14:14:51  User logged in: User 1         ││
││ 06/16/98 07:03:27  User logged out: User 1        ││
││ 06/16/98 07:00:46  User logged in: User 1         ││
││ 06/15/98 15:29:38  User logged out: User 2        ││
││ 06/15/98 15:29:15  User logged in: User 2         ││
││ 06/15/98 15:27:31  User logged out: User 2        ││
││ 06/15/98 15:27:06  User logged in: User 2         ││
││ 06/15/98 13:56:34  User logged out: User 2        ││
││ 06/15/98 13:56:16  User logged in: User 2         ││
││ 05/29/98 10:28:17  User logged out: User 2        ││
│└──────────────────────────────────────────────────┘│
│                                                      │
│    Press [HOME]/[END]/[PGUP]/[PGDN] to browse.      │
│         Press [DELETE]/[D] to clear log.            │
│           Press [ESC] when finished.                │
╘══════════════════════════════════════════════════╛
```

Figure 4-14.   Event Log screen

If the event log contains multiple pages of information, you may navigate through these pages using **Page Up**, **Page Down**, **Home**, or **End** (or character equivalents). The following events are logged as they occur:

■   IRC user login

■   Failed login attempt

■   IRC user logout

■   Server logged critical error(s)

■   Event log cleared

■   Server reset

Additional events may be present or available through future firmware upgrades. To clear the contents of the event log, press **Delete**. To return to the Main Menu, press **Esc**.

Change Password

The Change Password option is available to users without supervisory access. These users are permitted to change their own passwords, but are prohibited from viewing or changing any other user attributes in the user database. IRC prompts the user for the old password, the new password, and for new password confirmation. A screen similar to the one shown in Figure 4-15 displays.

```
━━━━━━━━━━━━━━━━━ Change Password ━━━━━━━━━━━━━━━━━

   Old Password: _
   New Password:
   Confirm New Password:
```

Figure 4-15.   Change Password screen

The password is changed if the following conditions are met:

■   The old password matches the current password for the user

■   The new password confirmation matches the new password

■   The new password is at least 4 characters in length

■   Password entry has not been terminated by pressing **Esc**

Valid passwords must contain at least four characters and not more than 15.

Manage Login Information

Manage Login Information is available to users with supervisory rights. This option enables an administrator to add or delete users or modify an existing user's configuration remotely. Select *Manage Login Information* to display a screen similar to that shown in Figure 4-16.

```
┌──────── Manage Login Information ────────┐
│                                          │
│  1.  User 1                              │
│  2.  User 2                              │
│  3.  User 3                              │
│  4.  User 4                              │
│  5.  User 5                              │
│  6.  User 6                              │
│  7.                                      │
│  8.                                      │
│                                          │
│                                          │
│  Please Select A User to Modify          │
│  [A] = Add User, [D] = Delete User       │
│         [Enter] = Edit User              │
│                                          │
└──────────────────────────────────────────┘
```
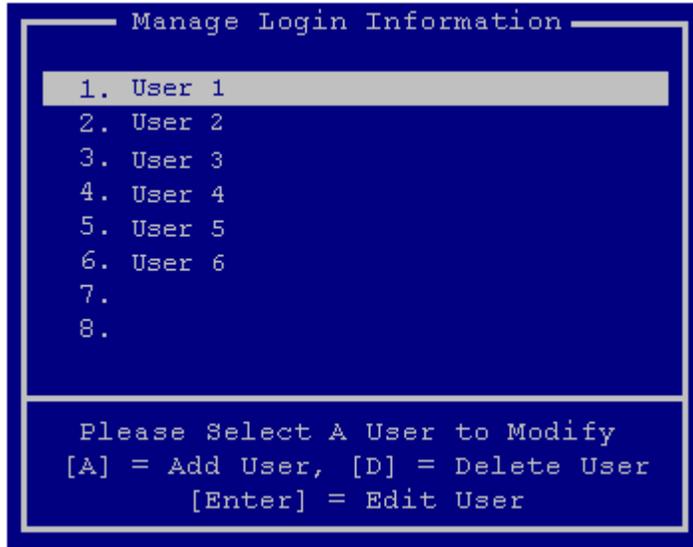
Figure 4-16.   Manage Login Information screen

Press **A** to add a user. You are then prompted to fill in the added user information.

To delete or modify a user, position the highlight next to the desired user and press **Enter** to edit the highlighted user, or **D** to delete the highlighted user. A confirmation message is displayed before a user is deleted.

Modify User Information

After selecting a user from the Manage Login Information screen, a screen similar to the one in Figure 4-17 displays. For new users, all fields are set to defaults.

```
┌─────────────── Modify User Information ───────────────┐
│                                                       │
│   1.  Username    :  User 1                           │
│   2.  Password    :  [select to change]               │
│   3.  Dialback # :                                     │
│                                                       │
│   4.  Supervisor Rights           :  Yes              │
│   5.  Remote Console Rights        :  Yes             │
│   6.  Reboot Server Rights         :  Yes             │
│   7.  Boot Sequence Replay Rights :  Yes              │
│   8.  Force Dial-Back              :  No               │
│                                                       │
│   9.  Save Modified Information                        │
│                                                       │
│                                                       │
│      [Enter] = Select, [ESC] = Cancel Changes         │
└───────────────────────────────────────────────────────┘
```
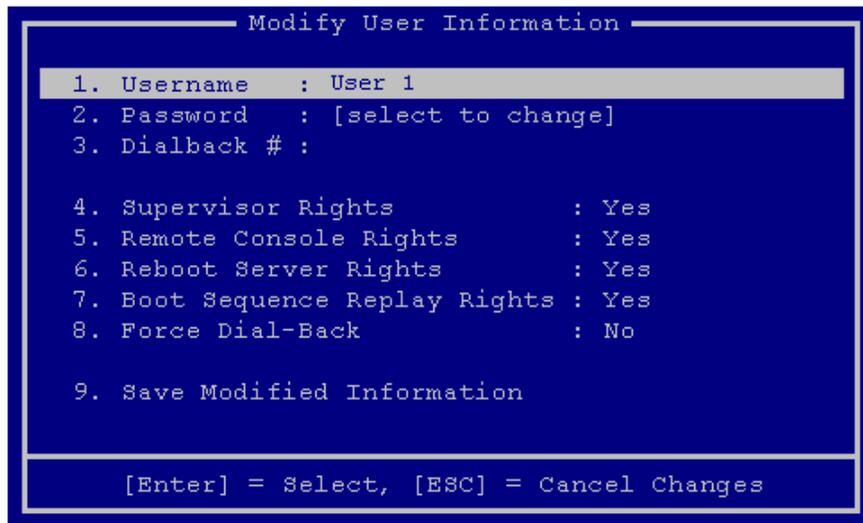
Figure 4-17.   Example: Modify User Information screen

See "User Configuration" in Chapter 2 for a description of the various fields in the Modify User Information dialog box.

To edit, position the highlight next to the desired field and press **Enter** to select. Security rights may be toggled by pressing the space bar. To accept changes, select *Save Modified Information*. To cancel changes, press **Esc**.

Manage Configuration

The *Manage Configuration* option, available to users with supervisory rights, allows an administrator to view or change the configuration parameters of IRC remotely. Since many configuration options are necessary for the proper operation of IRC, care must be exercised when making changes. Selecting *Manage Configuration* presents a screen similar to that shown in Figure 4-18.

```
 ════════════════════ Manage Configuration ════════════════════

   1. Remote Console Functions : Enabled
   2. Keyboard Type            : United States
   3. Communications Setup...

   4. System Information
   5. IRC Information


        [Enter] = Select, [ESC] = Main Menu
```
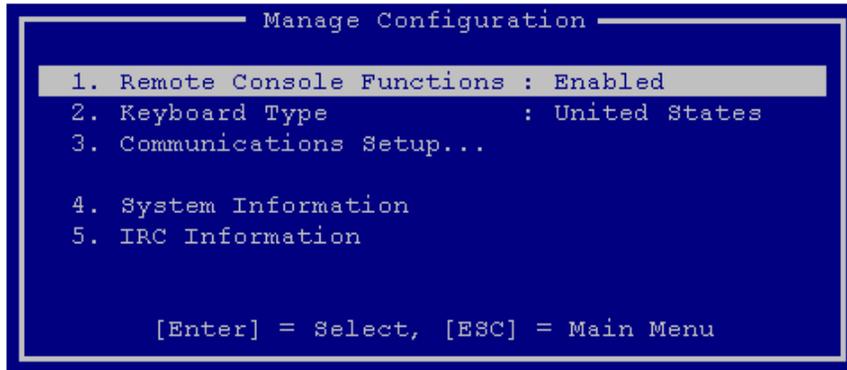
Figure 4-18.   Manage Configuration screen

From this screen, the administrator can perform the following functions:

■   **Remote Console Functions** — Toggles the status of Remote Console Functions from Enabled to Disabled.

> **IMPORTANT:**   If Remote Console Functions are remotely disabled, IRC no longer accepts incoming calls. IRC can only be re-enabled by running the Compaq System Configuration Utility.

■   **Keyboard Type** — Specifies which country-specific keyboard is attached to the managed server. For proper remote keyboard operation, this setting must match the keyboard country configuration of the server's OS. This option allows the administrator to ensure that the keyboard type matches the keyboard configuration of the server.

■   **Communications Setup…** — Allows the administrator to view or change all communication parameters used by Integrated Remote Console.

■   **System Information…** — Displays hardware and firmware revision information pertaining to the managed server.

■   **IRC Information** — Displays hardware and firmware revision information pertaining to Integrated Remote Console.

To edit or select a particular item, position the highlight to the desired field and press **Enter**. To accept changes, select Save Modified Information. To reject changes, press **Esc**.

Changes made in the Communications Setup configuration screen are permanent if you accept these changes as they are applied. The Save Modified Information pertains only to changes made to the Remote Console Functions and Keyboard Type fields.

Communications Setup

Selecting *Communications Setup* from the Manage Configuration screen displays the administrator screen, similar to the one shown in Figure 4-19.

Figure 4-19.   Communications Setup screen

4-25

4-25

NOTE: The Compaq System Configuration Utility helps in the initial setup of communications setup parameters.

The following communications parameters can be changed from this screen:

■ Baud Rate

■ Data Bits

■ Stop Bits

■ Parity

See Chapter 2 for detailed information on these parameters. To edit or select a particular item, position the highlight on the desired field and press **Enter**. To accept changes, select Save Modified Information. To reject changes, press **Esc**.

Modem Strings

Select *Edit Modem Strings* at the Communications Setup screen to display a screen similar to that shown in Figure 4-20. Again, see Chapter 2 for detailed information on how these strings should be set. See Appendix A for additional information on modem configuration commands and parameters.

```
══════════════════════ Edit Modem Strings ══════════

   1. Init String 1 : ATZ
   2. Init String 2 : AT&C1&D2
   3. Dial String   : ATDT
   4. Answer String : ATS0=1

   5. Restore Default Modem Strings

   6. Save Modified Information


         [Enter] = Select, [ESC] = Cancel Changes
```
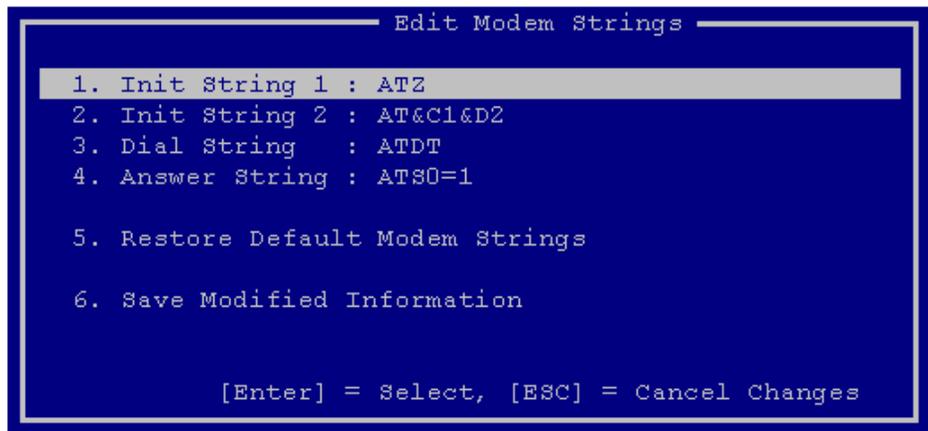
Figure 4-20.   Edit Modem Strings screen

Compaq Integrated Remote Console User Guide

From this screen, the administrator can change the strings used to initialize and communicate with the modem. See Chapter 2 for detailed information on the modem strings.

To change any of the modem strings, position the highlight next to the desired field and press **Enter**. To accept changes made to these strings, select Save Modified Information. To restore default modem strings, select Restore Default Modem Strings. To cancel changes, press **Esc**.

Disconnecting

You can terminate an IRC session at any time either by selecting *Disconnect* from the Main menu or the *Close* or *Disconnect* option from terminal emulation applications. The logout event is appended to the IRC connection log.

Figure 4-21.   Terminating the connection

Chapter 5
Using Attention Key Sequences

You can use attention key sequences in Remote Console mode to maximize ANSI terminal emulation functionality. Integrated Remote Console (IRC) provides a mechanism to enter complicated key sequences otherwise unavailable from a standard ANSI terminal emulation program. This mechanism consists of key sequences where you press a configurable "attention key" followed by a standard ANSI key.

The attention key is actually a combination of key strokes (usually two) that alerts the server that a command is about to follow. IRC lets you define the attention key, or you can use the default selection **Ctrl** + **A**.

Attention key sequences are used to perform three types of functions:

■ Attention Key *Command* Sequences

■ Attention Key *Support* Sequences

■ Attention Key *Compose* Sequences

Each of the items is described in detail in the following sections.

Attention Key Command Sequences

These sequences, listed in Table 5-1, issue an instruction to IRC from within remote console mode.

Table 5-1
Attention Key Command Sequences

Key	Command
[Atn] Esc	Exits the Remote Console mode and displays the IRC Main Menu.
[Atn] Space	Instructs the Integrated Remote Console application to refresh the server console screen on the remote terminal. This command is only necessary if the remote terminal program is reset or instructed to clear its screen.

Example: Returning to IRC Main Menu

For example, to exit the Remote Console mode and display the Main Menu:

1. Enter the attention key. In this example the attention key is set to its default: **Ctrl**+**A**. Press both the **Ctrl** and the **A** keys down simultaneously. Release both keys, making sure to release the **Ctrl** key last.

2. Enter the command to exit Remote Console mode and return to the main menu. This command is key is **Esc**.

Step 1 signals IRC that a special key sequence is to follow. The **Esc** key pressed in step 2 is therefore interpreted as the "exit to Remote Console mode" command and not interpreted as a keystroke needing to be typed at the server keyboard.

Attention Key Support Sequences

These sequences emulate special PC keyboard keys that are not part of the ANSI standard, such as function keys and **Page Up** and **Page Down**.

Table 5-2 lists the attention key sequences for entering special non-ANSI key sequences from any ANSI terminal program. Included are keys such as **Home**, **End**, **Page Up**, **Page Down**, and function and arrow keys.

> **NOTE**:   Some of the sequences described in Table 5-2 are not required with Compaq Insight Manager or other ANSI terminal programs that support function keys, **Page Up**, **Page Down**, **Home**, and **End**.

Table 5-2
Attention Key Support Sequences

Key	Key it is equal to on the server console
[Atn] 1-9, 0	Corresponding **F1**-**F10**
[Atn] - (minus)	**F11**
[Atn] =	**F12**
[Atn] I	↑ (up arrow)
[Atn] M	↓ (down arrow)
[Atn] Y	**Insert**
[Atn] B	**Delete**
[Atn] J	← (left arrow)
[Atn] K	→ (right arrow)
[Atn] O	**Page Up**

Continued

Attention Key Support Sequences *Continued*

Key	Key it is equal to on the server console
[Atn] , (comma)	**Page Down**
[Atn] U	**Home**
[Atn] N	**End**
[Atn] [Atn]	Generates a literal **Atn** sequence to the server console. For instance, if the attention key was assigned to **Ctrl** + **A**, but an actual **Ctrl** + **A** was required as input to the server console, the user could insert a literal **Ctrl** + **A** by pressing this sequence twice.

Example: Pressing F10 Key

For example, if you wanted to press the **F10** key on the managed server:

1. Enter the attention key. In this example the attention key is set to its default: **Ctrl+A**. Press both the **Ctrl** and the **A** keys down simultaneously. Release both keys, making sure to release the **Ctrl** key last.

2. Enter the command to type an **F10** at the server's keyboard. This command key is **0** (zero).

Step 1 signals IRC that a special key sequence is to follow. Pressing **0** (zero) in step 2 generates an **F10** on the managed server.

Attention Key Compose Sequences

These sequences extend the ability to enter complex keyboard sequences necessary in the PC environment, like **Ctrl** + **Alt** + **Delete**.

Table 5-3 identifies keystroke sequences used to enter complex keyboard commands. These settings are automatically cleared after an ANSI key is entered, or if the Sequence Clear or Sequence End attention code is entered.

Table 5-3
Attention Key Compose Sequences

Key	Function
[Atn] A	Emulates holding down the left **Shift** key.*
[Atn] X	Emulates holding down the left **Alt** key.*
[Atn] Z	Emulates holding down the left **Ctrl** key.*
[Atn] ' (single quote)	Emulates holding down the right **Shift** key.*
[Atn] . (period)	Emulates holding down the right **Alt** key (This key corresponds to the **AltGr** key on the International keyboards).*
[Atn] /	Emulates holding down the right **Ctrl** key.*
[Atn] Backspace	Sequence Clear - Clears all **Shift**, **Alt**, and **Ctrl** flags without entering any key sequence into the server console. It provides a means of canceling the composition of any special-key sequence.
[Atn] Enter	Sequence End – Signals the end of the special-key composition sequence, instructing Remote Console to generate a key sequence based upon the **Shift**, **Alt**, and **Ctrl** flags set through other attention sequences. This is used if the special key sequence does not end with a non-attention key, like **Alt**-**Shift**.

*Other attention key signals can be used simultaneously if the appropriate attention sequence(s) are entered before terminating the sequence.

Example: Entering Alt + P

For example, if you needed to enter a command such as **Alt** + **P** on the managed server:

1. Enter the attention key. In this example the attention key is set to its default: **Ctrl**+**A**. Press both the **Ctrl** and the **A** keys down simultaneously. Release both keys, making sure to release the **Ctrl** key last.

2. Enter the command to press and hold the **Alt** key on the managed server's keyboard. This command key is **X**.

3. Press **P**.

Steps 1 and 2 signal IRC that you wish to compose a key sequence on the managed server's keyboard with the **Alt** key pressed down. Pressing the **P** key in step 3 completes your key sequence. IRC generates an **Alt**+**P** on the managed server keyboard.

If you performed steps 1 and 2 above but then decided that you did not want to continue with the intended command, you could abort the key sequence and release the **Alt** key by entering the sequence clear command:

1. Enter the attention key. In this example the attention key is set to its default: **Ctrl**+**A**. Press both the **Ctrl** and the **A** keys down simultaneously. Release both keys, making sure to release the **Ctrl** key last.

2. Press **Backspace**.

The **[Atn] Backspace** sequence cancels the **Alt** key flag that was set by pressing **[Atn] X**.

Example: Entering Ctrl + Alt + Del

The attention key compose sequences can be combined together and with other attention key support sequences to compose virtually any key combination. For example, if you needed to perform a **Ctrl** + **Alt** + **Del** key sequence on the managed server:

1. Enter the attention key. In this example the attention key is set to its default: **Ctrl**+**A**. Press both the **Ctrl** and the **A** keys down simultaneously. Release both keys, making sure to release the **Ctrl** key last.

2. Enter the command to press and hold the **Ctrl** key on the managed server's keyboard. This command key is **Z**.

3. Enter another attention key to begin the sequence to add the **Alt** key to list of keys that should be pressed down on the managed server's keyboard. Press **Ctrl** + **A** as above in step 1.

4. Enter the command to add the **Alt** key to the list of keys pressed down on the managed server's keyboard. This command key is **X**.

5. Enter another attention key to begin the **Del** key support sequence. Press **Ctrl** + **A** as above in step 1.

6. Enter the command to press the **Del** key on the managed server's keyboard. This command key is **B**.

Steps 1 and 2 signal IRC that you wish to compose a key sequence on the managed server keyboard with the **Ctrl** key pressed down. Steps 3 and 4 signal IRC that you additionally want to hold down the **Alt** key on the managed server keyboard. Steps 5 and 6 generate a **Del** key on the managed server keyboard. Since the **Del** key was preceded by the **Ctrl** and **Alt** compose sequences, all three are pressed simultaneously on the server's keyboard. The **Del** support sequence, since it is not an attention compose sequence, automatically ends the compose sequence, releasing both the **Ctrl** and **Alt** keys following the **Ctrl** + **Alt** + **Del** sequence.

More Attention Key Examples

Table 5-4 summarizes how to compose some common key sequences within the Remote Console mode from any ANSI terminal program. The abbreviations **L-Shift**, **L-Ctrl**, and **L-Alt** are used to represent **Left-Shift**, **Left-Ctrl**, and **Left-Alt** respectively. Similarly, **R-Shift**, **R-Ctrl**, and **R-Alt** represent **Right-Shift**, **Right-Ctrl**, and **Right-Alt**, respectively.

Table 5-4
Attention Key Composition Examples

Desired Key sequence	Attention Key sequence
F10	**[Atn] 0** (emulates pressing the **F10** key)
Alt + **F**	**[Atn] X F** (emulates pressing both **L-Alt**, and **F** simultaneously)
Ctrl + **Alt** + **Del**	**[Atn] Z [Atn] X [Atn] B** (emulates pressing **L-Ctrl**, **L-Alt**, and **Delete** simultaneously)
Alt + **L-Shift**	**[Atn] X [Atn] A [Atn] Enter** (emulates pressing **L-Alt** and **L-Shift** simultaneously.)

Attention Key Template

Figure 5-1 illustrates the layout of the attention key sequences. Essentially the attention key places the keyboard in an alternate mode, much like the "alt-function" keys on a laptop keyboard. Note the geographic placement of these sequences as seen on an U.S. domestic keyboard layout.
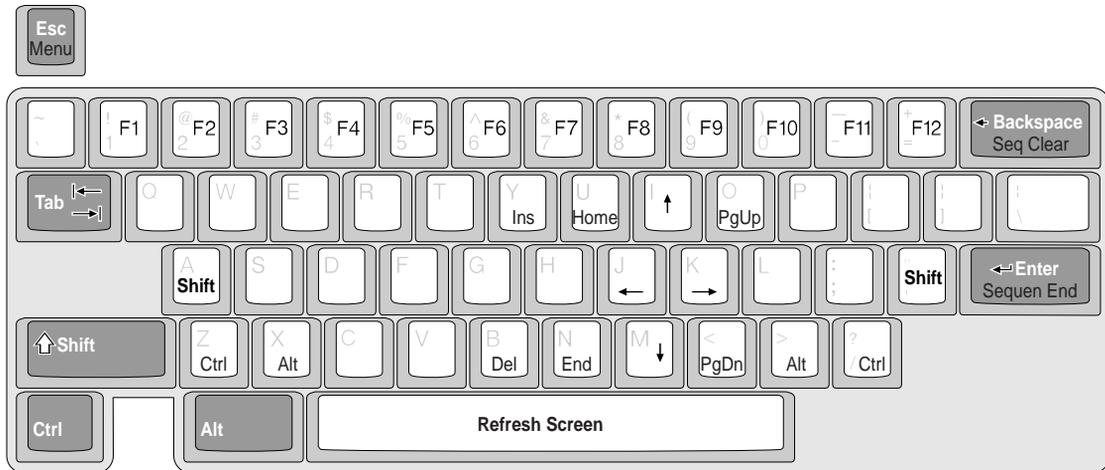
Figure 5-1.   Example: United States Keyboard with Attention Keys indicated

Changing the Attention Key

See Chapter 4 for instructions on how to change the attention key. The attention key may be changed to any ASCII key, preferably a key that is infrequently used.

Chapter 6
Additional Modem Information

Integrated Remote Console (IRC) has been tested and is compatible with a wide variety of internal and external modems. IRC requires a high-speed (14400 baud or greater) Hayes-compatible serial modem. Virtually all external RS-232 serial modems meet this requirement.

Modem Types

Internal modems must be ISA and must be controller-based. The following sections describe many of the commercially available types of modems and their compatibility with IRC.

Table 6-1
Modem Requirements

Internal Modem	External Modem
■ High-Speed with error negotiation protocol (V.FC, V.42, V.34, LAPM, V.90)	■ High-Speed with error negotiation protocol (V.FC, V.42, V.34, LAPM, V.90)
■ Controller-based (16550 or equivalent)	■ Serial (RS-232) Interface
■ ISA adapter card	
■ Jumper-able resource settings (COM & IRQ)	

External Serial Modems

IRC supports most external high-speed serial modems. Some modems, like the Compaq Microcom 510, offer both a serial and parallel (APT) interface. Such modems must be connected through the serial interface to operate correctly with IRC.

External modems are cabled to the managed server using a standard straight-through DTE to DCE style cable. A standard DB-9F to DB-25M cable can be used and there are no specific requirements specific to IRC.

Important Tip

Most external modems offer modem state indicator lights, which can be useful troubleshooting tools, particularly if you are configuring IRC for the first time. If IRC is configured for the proper COM port, the TR or DTR indicator should be illuminated shortly after the Compaq ProLiant splash screen is displayed during power-on-self-test (POST). The AA indicator indicates that the modem has been placed in auto-answer mode. If the modem has not been pre-configured (through switches on the modem) for auto-answer mode, this signal should also be illuminated shortly after the TR indicator. This indicates that IRC can communicate with the modem and the modem has correctly received the auto-answer string configured through the Compaq System Configuration Utility. If the managed server is running Windows NT as its primary operating system, this indicator can also reflect the ownership of the modem in the shared configuration. Windows NT 4.0 generally does not program the modem for auto-answer mode. As a result, if the AA indicator is illuminated after Windows NT has booted, IRC currently owns the modem. Similarly, if the AA indicator is not illuminated, the modem is currently in use by the operating system.

Internal ISA Plug-n-Play Modems

Internal ISA Plug-n-Play modems, designed for the PC consumer industry, are designed to be easy to install and configure. Such modems rely on the operating system for resource configuration, eliminating the need for the user to set pre-determined jumpers. The modem's COM port and interrupt settings are automatically configured by the operating system and can be adjusted at run-time to resolve resource conflicts when new hardware is installed. Although these modems greatly simplify the hardware configuration process, they require the operating system for proper operation.

IRC must be able to access the communications device, regardless of the state or health of the server operating system. If the managed server is unable to load the operating system, IRC is unable to access the communications device. In addition, the operating system may readjust the modem resources at run-time. For IRC to function correctly the modem configuration must be fixed and it must be available regardless of the state of the managed server.

Fortunately, however, most ISA internal Plug-n-Play modems contain jumpers that allow the modem to be configured in "legacy" mode. These jumpers ensure that the modem can be used whether or not the operating system loads. For proper operating with Integrated Remote Console, internal plug-n-play modems must be jumpered for "legacy" mode, with the resources manually configured using methods described in Chapter 2.

"Windows" Modems

Since these modems require the operating system and a proprietary driver to function correctly, they cannot be used with IRC. "Windows" modems, offered by some modem manufacturers, attempt to reduce the hardware complexity and cost of internal modems by replacing the industry standard controller interface with a proprietary one. Functions that would normally be performed on the modem in hardware are shifted to the main CPU. These modems require a specific driver and considerable CPU resources to function correctly. These modems are usually a poor choice in a server environment.

"Windows" modems were not designed to be accessible from anywhere except through the operating system. As mentioned above, IRC must be able to access the communications device regardless of the state or health of the server operating system.

PCI-based Modems

PCI-based modems have recently been introduced to the industry to replace the need for internal modems in computers without ISA slots. Most PCI-based modems are based on proprietary "windows" modem interfaces and are not supported by IRC (see above on "windows" modems). If an internal modem is desired, use a controller-based ISA modem. If an ISA modem is unable to be accommodated, use an external serial modem.

Modem Configuration Strings

For IRC to function correctly, the modem must be configured correctly. The modem is configured using the primary and secondary initialization strings, which are specified during the configuration process. For many modems, the proper initialization strings can be found in Appendix A. This section provides the information necessary to determine the proper initialization strings for modems not listed in this chapter.

To function in a wide array of computing environments, modems have many configuration options. Table 6-2 provides a summary of those settings which are important for compatibility with IRC.

Table 6-2
Modem Configuration Setting Summary

Parameter	Configuration Value (AT Command)
Computer to Modem serial port speed	**Fixed** (varies)
Data Carrier Detect Operation	**Normal** (&C1)
Data Terminal Ready Interpretation	**Normal** (&D2)
Flow Control	**Hardware** (varies)
Error Control	**Enabled** (varies)
Response Codes	Only important if using modem sharing – Configure identically to operating system (varies)

Computer to Modem Serial Port Speed

Some modems have a configuration option that controls whether the DTE serial port interface is fixed at a predetermined baud rate or changed dynamically based upon the modem to modem connect rate. In "floating DTE" mode, the Computer to Modem speed is automatically adjusted based upon the Modem to Modem negotiated baud rate. For IRC to operate properly, the DTE (server to modem) baud rate must be set to *fixed*. For many enhanced high-speed modems, this is the default setting following a modem reset. This configuration command must be appended to the IRC initialization string if your modem does not default to the *fixed* setting (particularly a problem with U.S. Robotics modems). Improper setting of the DTE speed configuration results in the inability to obtain a login prompt from IRC after establishing a connection. (See Appendix C, "Troubleshooting"). Refer to your modem documentation for more details. Modem vendors differ on the specific nomenclature used to refer to this setting. Look for terms such as "Fixed/Floating DTE," port-rate adjust, speed conversion, or buffered mode. Look for the *&B* or *\J* setting in your modem's AT command reference.

Data Carrier Detect (DCD) Operation

Most modems have a configuration option that controls the assertion of the DCD serial port interface signal. Typically DCD can be configured so that it is either always asserted (DCD Override) or only asserted when connected to another modem (DCD Normal). For Integrated Remote Console to function properly, the modem must be configured to assert DCD only when a carrier is established with another modem. Improper setting of this configuration option results in the inability to obtain a login prompt from Integrated Remote Console after establishing a connection. The *&C* AT command controls this setting in most modems. Since modem vendors differ with respect to the default setting of this configuration option, appending an *&C1* to the Integrated Remote Console initialization string ensures proper DCD operation.

Data Terminal Ready (DTR) Interpretation

Most modems have a configuration option that controls the interpretation of the DTR serial port interface signal. For IRC to function properly, the modem must be configured to terminate a connection whenever DTR is dropped. Improper setting of this configuration option results in the improper termination of an existing IRC session and may result in the inability to establish a future IRC connection. The *&D* AT command controls this setting in most modems. Since modem vendors differ with respect to the default setting of this configuration option, appending an *&D2* to Integrated Remote Console's initialization string insures proper DTR interpretation.

Flow Control

IRC is designed to use hardware flow control on the serial port interface. For IRC to function properly, the modem must be set to hardware flow control for both receive and transmit operations. Improper setting of this configuration option could result in the loss of characters, causing the remote terminal to display incomplete or garbled information. Modem manufacturers differ with respect to how this configuration option is implemented and controlled. Typical AT commands to configure flow control include *&K, &H, &R, &J, &E, \G or \Q*. Refer to your modem's AT command reference for more details.

Error Correction

Most high-speed modems, by default, automatically negotiate an error control protocol such as v.42 (LAPM) or MNP upon establishing a connection to another modem. For connection speeds in excess of 1200 baud, error control is essential to insure proper communication between IRC and the management console. If error control is not negotiated between modems, erroneous data may result in either the inability to obtain a login prompt, garbled characters on the terminal display, or incorrect or extra keystrokes being sent to the server. Error control is normally negotiated, unless it is explicitly turned off on either modem or the modems are incompatible. If you encounter any of the problems mentioned above, try using identical modems for both the server and the management console. Typical AT commands to configure error control include *\N, &Q, &M, &E,* and *S-Register* settings. Refer to your modem's AT command reference for more details.

Data Compression

Most high-speed modems also try to negotiate a compression protocol such as v.42 bis or MNP5 upon establishing a connection to another modem. Compression settings do not effect the ability to connect to IRC. However, negotiating such a protocol is advantageous, since it greatly accelerates responses from the server, particularly in remote console mode. Typically, compression is normally negotiated, unless it is explicitly turned off on either modem or the modems are incompatible. Typical AT commands to configure compression include *&K, %C, &E,* and *S-Register* settings. Refer to your modem's AT command reference for more details.

Response Codes

The way a modem responds to commands and events is also highly configurable. Through AT command strings, the modem can be instructed to communicate this information numerically or through verbal descriptions. For instance, based on its configuration, the modem may return "RING" in response to an incoming call, or the number 2. In addition, the modem can be configured return varying levels of information in several different formats.

Since modems vary greatly in how and what they send in response to event, IRC does not use modem response codes when communicating with the modem. Consequently, it does not matter what response code format it chosen or what is communicated in the response codes. IRC uses the modem control signals to determine events such as connect and ring.

Response code format commands are important, however, if you are sharing the modem with the operating system. In this case, IRC must have the modem configured to respond in a way that the operating system will expect and understand. See Appendix A for instructions in how to determine how the operating system has configured the modem under Windows NT 4.0.

There are several different AT commands on each modem to configure different attributes of the response codes. Typical AT commands used to configure the response codes include, *V*, *\V*, *W*, *X*, *Q*, *&A*, and S-register settings (particularly S95). Refer to your modem's AT command reference for more details.

Chapter 7
Direct Connections

In a data-center environment, connecting a modem to each server may be undesirable. For this reason, Integrated Remote Console (IRC) supports configurations whereby access can be obtained through companion hardware, such as a "buddy server" or terminal server. In a "buddy server" configuration, two servers are directly connected to each other's serial ports. If either server fails, the other server can be used to gain out-of-band access to the failing one.

In a terminal server configuration, a cluster of servers can be connected to a terminal server or terminal concentrator, allowing out-of-band access to any of the servers through either a LAN (telnet) connection, or through a shared modem or bank of modems.

For both configurations, identical concepts apply. The following section entitled "Connecting Using a Terminal or Terminal Emulator" describes the elements necessary to setup a direct-connection to IRC from a generic terminal device. Additional information necessary for terminal server configurations is found later in this chapter in the section entitled "Connecting to a Terminal Server."

Connecting Using a Terminal or Terminal Emulator

The following section contains information necessary to connect IRC directly to a terminal or terminal emulator. For simplicity, the terminal or terminal emulator is referred to as the "terminal."

For proper operation in direct connect mode mode, IRC requires the following:

1. A null-modem cable, with the complete set of modem control signals.

2. A terminal or terminal emulator that supports the complete set of modem control signals, including hardware flow control, proper DTR assertion, and DCD interpretation.

Cable Requirement

For proper communication, IRC requires a null-modem cable with a complete set of modem control signals. The exact wiring diagram for this cable is shown in Appendix B. Cables are occasionally labeled as "null-modem" which do not conform to this diagram. Check with your cable vendor to ensure that the cable meets the requirements shown in Appendix B. Cables that differ from this specification may not function correctly.

Communication Requirements

For proper operation, both IRC and the terminal must be configured and operate compatibly. The following communication attributes are important for proper out-of-band access:

■   **Managed Server Serial Port Configuration** — For a direct-connect configuration, one of the server's integrated serial ports is used as the communication device. Verify that the desired port is enabled and configured correctly. See "Configuring an external modem or direct connection" in Chapter 2 for more details. One suggested configuration is using integrated serial port B configured as COM2, IRQ3.

■   **IRC Configuration** — Make sure you have configured IRC's communication device as *direct connect.* Also ensure that the COM port and interrupt settings match the serial port selected above. In direct-connect configurations, it is recommended that the serial port sharing options be set to *dedicated,* making the selected serial port into a dedicated out-of-band management port. Configure and note the baud rate and communication settings, as the terminal needs to mirror these settings to gain access.

■   **Terminal Communication Settings** — Configure the terminal to match to communication settings specified for IRC. This includes the communication baud rate, number of data bits, whether a 7-bit parity mode is selected, and the number of stop bits. If the terminal is not configured correctly, you can not obtain a login prompt from IRC.

■   **Flow Control** — Configure the terminal for *hardware* flow control. An improper flow control setting could result in the loss of characters, causing the terminal to display incomplete or garbled information, especially during peak video activity.

■ **DTR Control** — For compatibility with IRC, the terminal must assert DTR whenever a communication session is open. IRC uses the DCD control signal (which is driven by the terminal's DTR output) to determine whether a remote session is open. IRC ignores any serial port activity whenever DCD is inactive. Consequently, if the terminal does not assert it's DTR output, it is impossible to establish a connection with IRC. Conversely, the terminal must lower DTR whenever a communication is closed. This ensures that the current user is properly logged out and IRC will return to a passive state.

■ **DCD Interpretation** — IRC asserts it's DTR serial port control signal whenever it is prepared to accept an incoming login request. Through the null-modem cable, this signal is wired to the terminal's DCD input, which is usually reflected by the terminal's status bar as "CARRIER" or "ONLINE." IRC drops DTR in response to a logout or close session request.

Connecting Using a Terminal Server or Concentrator

A terminal server can be a perfect compliment to IRC, particularly in a data-center environment where servers are grouped in clusters. Through one terminal server, a remote administrator can gain access to a number of different servers either through a shared modem or through a local area network connection. This topology greatly decreases or eliminates the need for multiple modems and phone lines. This topology also provides another level of security since access can be restricted to a trusted private network or a centralized remote access server.
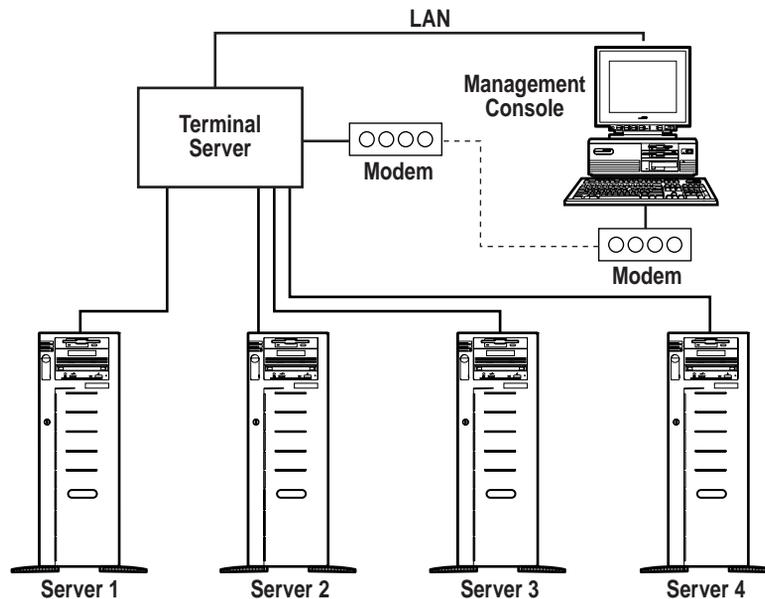
Figure 7-1. Typical terminal server topology

Figure 7-1 shows a typical terminal server topology. In such a configuration, the terminal server is directly connected to the integrated serial ports on a cluster of servers. The Integrated Remote Console feature of each server is configured for direct-connect access through the selected integrated serial port. Out-of-band access to any connected server can be obtained by establishing a TELNET connection through the terminal server to the appropriate port.

Such an implementation has three requirements:

1. You must select or obtain an appropriate cable or adapter to connect the terminal server asynchronous serial port to the managed server DB-9F serial port.

2. You must properly configure the IRC feature of each server for this environment.

3. You must configure each port of the terminal server with the necessary serial port settings.

Each of these requirements is described in detail in the following sections.

Obtaining the Appropriate Cable

Unfortunately, this is usually the biggest obstacle preventing proper operation of Integrated Remote Console in this environment. To obtain the necessary connector density, terminal servers typically route the serial ports to non-standard connectors. Typically, the serial port connections are provided in an RJ-45 style connector located either on the terminal server or available through a special high-density "break-out" cable. Although the use of the RJ-45 connector is somewhat standard, the way the signals are routed to this connector differ from manufacturer to manufacturer. Consequently, the adapter required to connect to the DB-9F connector on the managed server differs with each brand of terminal server. Adapters offered by the terminal server vendors are typically constructed to connect to simple RS-232 devices and may not contain the complete set of serial port control signals which Integrated Remote Console requires to operate correctly. The requirements of the necessary adapter are listed in Table 7-1. Check with your terminal server vendor to make sure all these conditions are satisfied.

IRC requires a complete null-modem cable connection to operate correctly. For proper connectivity, the serial port signals must be wired in a fashion identical to the diagram shown in Appendix B. As shown in the diagram, the managed server serial port transmit (TX or TxD) must be wired to the serial port receive (RX or RxD) of the terminal server. Similarly, the managed server serial port receive (RX or RxD) must be wired to the serial port transmit (TX or TxD) of the terminal server. For proper flow-control, the request-to-send (RTS) and clear-to-send (CTS) signals must be similarly cross-wired. The data-terminal-ready (DTR) of the managed server must be connected to both the data-carrier-detect (DCD) and the data-set-ready (DSR) of the terminal server. Similarly, DTR signal of the terminal server must be connected to both DCD and DSR of the managed server. The DTR and DCD cross-connections are extremely important. Improper connection of these signals inhibits the ability to open a connection to IRC. Lastly, the ground (GND) connection of both devices must be connected together.

Connector Example

To demonstrate the proper adapter, a serial port found on the Cisco 2509/2511 terminal server is used as an example. On this terminal server, a breakout cable provides the serial port connectivity through individual RJ-45 style connectors. The RJ-45 connector is defined with the following pinouts:

Table 7-1
Example: Cisco 2509/2511 RJ-45 Connector Pinout

8-Pin RJ-45	Signal	Direction with respect to terminal server
1	CTS	Input
2	DSR/DCD	Input
3	RXD	Input
4	RXD/GND	--
5	TXD/GND	--
6	TXD	Output
7	DTR	Output
8	RTS	Output

Using the information provided above from the terminal server manufacturer and the cable specified in Appendix B, the following adapter can be obtained.

Table 7-2
Example: Cisco 2509/2511 RJ-45 to DB-9F Adapter

Terminal Server		Managed Server	
8-Pin RJ-45	Signal	9-Pin DB-9F	Signal
1	CTS	7	RTS
2	DSR/DCD	4	DTR
3	RXD	3	TXD
4	RXD/GND	5	GND
5	TXD/GND	5	GND
6	TXD	2	RXD
7	DTR	1 & 6	DCD & DTR
8	RTS	8	CTS

NOTE: The above table is only applicable to the Cisco 2509/2511 terminal server and is only provided as an example of how such an adapter is to be constructed.

Configuring Integrated Remote Console

See "Configuring Integrated Remote Console" in Chapter 2 for details on how to make the appropriate configuration settings to the managed server using the Compaq System Configuration Utility. Ensure the following settings are correct.

■ **Configure the Managed Server Serial Port** — Since the terminal server is typically directly connected to one of the managed server's integrated serial ports, you must verify that the desired port is enabled and configured correctly. See "Configuring an external modem or direct connection" in Chapter 2 for more details. One suggested configuration is using integrated serial port B configured as COM2, IRQ3.

■ **Integrated Remote Console Communication Device Settings** — Set the communication device to *direct connect* and ensure that the communication device COM port and interrupt settings match the serial port selected above.

■ **Integrated Remote Console Sharing Options** — In instances where a terminal server is used, in-band management information is typically available directly through a LAN connection. Consequently, the serial port sharing option should be set to *dedicated,* making the selected serial port a dedicated out-of-band management port.

■ **Integrated Remote Console Communication Settings** — Set the baud rate and communication settings to match those configured on the terminal server. A baud rate of 19200 is sufficient for most applications, although a higher rate can be selected provided the cable and terminal server can accommodate it. The recommended setting of data, parity, and stop bits are 8, none, and 1 respectively. Keep in mind that these settings must match the settings configured for the corresponding port on the terminal server.

Configuring the Terminal Server

Typically, terminal servers are extremely adaptable and configurable. The exact configuration mechanisms and commands differ between manufacturers. Use the following guidelines along with your terminal server documentation to correctly configure the terminal server to communicate with Integrated Remote Console.

■ **Communication Settings Settings** — Configure each port on the terminal server to match to communication settings specified for Integrated Remote Console. This includes the communication baud rate, number of data bits, whether a 7-bit parity mode is selected, and the number of stop bits. If the receive and transmit baud rates are each configurable, make sure they are both set to match *maximum baud rate* settings specified in IRC. Note that the terminal server's default configuration almost always needs to be modified. If the communication settings are not configured correctly, you will not be able to obtain a login prompt from Integrated Remote Console.

■ **Flow Control** — Configure each port on the terminal server for *hardware* flow control. If the receive and transmit functions are each configurable, make sure they are both set for *hardware* flow control. An improper flow control setting could result in the loss of characters, causing the remote terminal to display incomplete or garbled information.

■ **DTR Control** — This setting is crucial to the operation of the Integrated Remote Console. The terminal server must be programmed to assert DTR whenever a communication (TELNET) session is open on the selected serial port. Integrated Remote Console uses the DCD control signal (which is driven by the terminal server's DTR output) to determine whether a remote session is open. Integrated Remote Console ignores any serial port activity whenever DCD is inactive. Consequently, if the terminal server does not assert it's DTR output, it is impossible to establish a connection with Integrated Remote Console. Conversely, if the terminal server always asserts DTR, IRC always thinks a remote session is being requested, which could result in a slight performance penalty on the managed server. In addition, IRC does not automatically log out a user whenever the communication port is closed. For proper operation of IRC, the DTR output of the terminal server must be asserted whenever a communication session is opened, and removed whenever a communication session is closed.

Chapter 8
Modem Sharing

The modem sharing feature of Integrated Remote Console (IRC) allows you to use the same modem for hardware and operating system-based management. If asynchronous management is installed on the managed server, the management console can remotely monitor and receive traps from the managed server through an operating system-based dial-up connection on the shared modem. This same connection can be used to obtain graphical remote control through applications such as pcANYWHERE or Compaq Carbon Copy. In the event that the server goes off-line and these utilities are unavailable, access to the server can still be obtained through IRC.

The modem sharing feature does not require any additional software or drivers to be installed on the managed server. In this mode, IRC owns the configured modem and performs the function of modem arbitrator. If IRC detects the operating system attempting to access the modem or if an incoming call is identified as destined for the operating system, the modem is given to the operating system, allowing the connection to complete normally. Once IRC has relinquished the modem, it monitors the modem usage, reclaiming the modem once the call completes and 60 seconds of inactivity is detected.

For incoming calls, it is essential that IRC configure the modem in a way that the operating system will expect and understand. Consequently, the communication settings of IRC must be identical to the communication settings used by the operating system. In addition, the modem must likewise be configured identically. This is accomplished through the primary and secondary initialization string configuration settings of IRC.

To aid in the proper selection of these strings, Appendix A contains a table of commonly used modems and the suggested initialization strings. It is strongly suggested that you use one of these modems along with the recommended initialization strings. If your modem is not listed in this table, see Chapter 6 in conjunction with your modem's AT command reference to determine the proper string. Advanced Windows NT 4.0 users can use the procedure found later in this chapter to extract the operating system initialization strings.

Asynchronous Management

Asynchronous Management is a Compaq software option that allows you to monitor server health and receive traps through an asynchronous (modem) connection. This feature is essential to properly manage remote servers that may not be connected through a local area network. For servers with a LAN connection, this feature provides an important backup communication path in instances when the network is down.

Asynchronous Management runs on top of the operating system's dial-up networking capability. To gain access to the managed server, a point-to-point protocol (PPP) connection is established, providing the necessary virtual networking transport to carry the full suite of SNMP management data.

If modem sharing is enabled, this same modem can be used to invoke IRC. IRC automatically detects incoming and outgoing PPP connections, forwarding the call on to the operating system. If, however, the connection is originating from an ANSI or telnet client, the call is accepted by the hardware-based, out-of-band management device: IRC.

To implement this configuration, configure asynchronous management as you would on a server without IRC. Once the operating system-based management utilities are configured and tested, enable IRC. If configured correctly, IRC should act as a communication "wrapper," transparently allowing the modem to be used by both applications.

Since a wide body of documentation already exists on installing dial-up networking and asynchronous management, that information is not repeated here. Consult the instructions supplied with your operating system to install dial-up networking. See the *Compaq Insight Manager User's Guide* for detailed instructions on setting up asynchronous management. IRC does not change the way these utilities are installed or configured.

A general outline of the configuration process is shown below.

1. **Disable IRC —** It is highly recommended that IRC be disabled before the operating system based utilities are installed. This step is not required, but can eliminate communication problems introduced by an incorrectly configured IRC.

2. **Install and Configure Dial-up Networking —** Install PPP communication software on the managed server. See the Compaq Insight Manager User's guide for detailed information on how to configure dial-up networking to accommodate asynchronous management.

3. **Install and Configure Asynchronous Management —** Install asynchronous management using the SmartStart Management CD supplied with your server. See the *Compaq Insight Manager User's Guide* for detailed information on configuring asynchronous management.

4. **Test Dial-up Networking and Asynchronous Management —** Once configured, test the configuration by dialing into the managed server. If dial-up networking is installed correctly, you should be able to establish a PPP connection with the server. Once connected, you should be able to browse management data if asynchronous management is configured correctly. Test dial-out asynchronous traps using the test facility provided by the asynchronous management software.

5. **Configure and Enable IRC** — Once proper operation with the operating system has been verified, enable IRC paying close attention to the communication port and modem initialization settings.

6. **Test OS Dial-in Capability** — Once enabled, you should be able to access either IRC or operating system-based management. Test the configuration by attempting to establish a dial-up networking connection. Wait several minutes after booting the operating system to insure that IRC has had a chance to regain ownership of the modem after the operating system initialization process. If the call does not connect properly, review your IRC configuration settings. See Appendix C for additional troubleshooting information. Test the connection several times, allowing at least 60 seconds to transpire between connections.

7. **Test OS Dial-out Capability** —Test the operating system's ability to dial out by sending a test trap using the "test" feature of the asynchronous communication software. Again, test the connection several times, allowing at least 60 seconds to transpire between connections.

8. **Test IRC Dial-in Capability** — Finally, test the ability to invoke the IRC login prompt by dialing into the server using an ANSI or telnet based client application. Once connected, you should be able to invoke the IRC login prompt by entering three carriage returns. If this attempt fails, wait at least 60 seconds and try again. See Appendix C for troubleshooting information if repeated attempts fail.

Graphical Remote Control

The modem sharing feature of IRC can also be used to obtain graphical remote control through OS-based applications such as pcANYWHERE or Compaq Carbon Copy. Typically, these programs support several communication methods, including several network transports as well as direct modem access. The recommended configuration is to use these programs in conjunction with dial-up networking. In this configuration, the same PPP connection can support both asynchronous management and graphical remote control.

To implement graphical remote control in this way, you must install both dial-up networking and the graphical remote control application. If you have already successfully installed asynchronous management or dial-up networking, you simply need to install the graphical remote control application.

A general outline of the configuration process is shown below.

1. **Disable IRC —** It is highly recommended that IRC be disabled before the operating system based utilities are installed. This step is not required, but can eliminate communication problems introduced by an incorrectly configured IRC.

2. **Install and Configure Dial-up Networking —** Install PPP communication software on the managed server. See the documentation supplied with your network operating system for detailed information on how to configure dial-up networking.

3. **Install and Configure Graphical Remote Control Application —**
    Install graphical remote control application using directions supplied by
    the software vendor. Configure the host for network TCP/IP access. The
    client application should also be configured for TCP/IP access,
    specifying the managed server's PPP IP address or server name.

4. **Test Dial-up Networking and Graphical Remote Control —** Once
    configured, test the configuration by dialing into managed server. If
    dial-up networking is installed correctly, you should be able to establish
    a PPP connection with the server. Once connected, you should be able to
    open a graphics remote control session using the TCP/IP transport.

5. **Configure and Enable IRC** — Once proper operation with the
    operating system has been verified, enable IRC paying close attention to
    the communication port and modem initialization settings.

6. **Test OS Dial-in Capability** — Once enabled, you should be able to
    access either IRC or operating system-based management. Test the
    configuration by attempting to establish a dial-up networking
    connection. Wait several minutes after booting the operating system to
    insure that IRC has had a chance to regain ownership of the modem after
    the operating system initialization process. If the call does not connect
    properly, review your IRC configuration settings. See Appendix C for
    additional troubleshooting information. Test the connection several
    times, allowing at least 60 seconds to transpire between connections.

7. **Test IRC Dial-in Capability —** Finally, test the ability to invoke the
    IRC login prompt by dialing into the server using an ANSI or telnet
    based client application. Once connected, you should be able to invoke
    the IRC login prompt by entering three carriage returns. If this attempt
    fails, wait at least 60 seconds and try again. See Appendix C for
    troubleshooting information if repeated attempts fail.

Additional Information

Determining Proper Initialization Strings in a Windows NT 4.0 RAS Environment

Each modem supported under Windows NT is uniquely described by an entry in a modem information file (*.INF). This file, which is either provided by Microsoft as part of the Windows NT installation or provided by the modem vendor, contains specific configuration information necessary for Windows NT applications to fully utilize the modem. Consequently, a given application may send out completely different and mutually incompatible initialization strings, depending upon which modem is configured.

Since modems can be configured to operate in any number of modes, it is important to ensure that IRC has programmed the modem in such as way that a forwarded call makes sense to the operating system. For example, Windows NT may expect numeric response codes from *modem A*, and verbose response codes from *modem B*.

Determining exactly how Windows NT has configured the modem is difficult, since the exact modem initialization strings are abstracted by the operating system.

Configuration strings which allow the modem to be used both by IRC and Windows Remote Access Server (RAS) for Windows NT 4.0 are shown in Table A-2 in Appendix A. If your modem does not appear in this table, the following procedure can be used to determine the proper initialization strings for your modem.

> **NOTE**:   This is an advanced procedure that assumes familiarity with Windows NT and Hayes AT command strings. Obtain a complete listing of the AT command reference for your modem from your modem manufacturer before proceeding. This procedure assumes that Windows Remote Access Server (RAS) is configured, installed, working, and completely tested with IRC disabled.

Temporarily disable IRC

If IRC is enabled, temporarily disable IRC using the Compaq System Configuration Utility. This prevents incorrect settings from interfering with RAS.

Turn on Modem Log File

1. From the Windows Control Panel, double-click on Modems.

2. From the Modem Properties dialog box, select the modem that you want to share with IRC and click **Properties**.

3. Click the **Connection** tab control. Click **Advanced** to display the Advanced Connection Settings dialog box.

4. Check the Record a log file option in the Advanced Connection Settings dialog box.

5. Click **OK** to dismiss the Advanced Connection Settings and Modem Properties dialog boxes.

6. Click **Close** to finish modem configuration.

7. Shutdown and Restart Windows NT to allow this new configuration setting to take effect.

View Modem Log File

After restarting Windows NT, a log file is recorded containing all activity to the modem. When the RAS service starts, the modem initialization commands are recorded in this log file.

1. From Windows Explorer, navigate to the directory where Windows NT is installed.

2. Locate the modem log file. This file is named *ModemLog_<name of modem>*. One way to quickly locate this file is by clicking the Modified column tab to sort the directory entries by their modified timestamp. The modem log should be one of the most recently modified entries.

3. Double-click the log file to view the contents in Windows notepad.

Locate the Modem Initialization Strings

The modem log file should contain information similar to the following:

Line #

```
1    01-19-1998 16:45:03.526 - Compaq Microcom 510 56K Ext Fax Modem
     Serial in use.
2    01-19-1998 16:45:03.526 - Modem type: Compaq Microcom 510 56K Ext
     Fax Modem Serial
3    01-19-1998 16:45:03.526 - Modem inf path: cpq510.inf
4    01-19-1998 16:45:03.526 - Modem inf section: Modem1
5    01-19-1998 16:45:03.526 - 115200,N,8,1
6    01-19-1998 16:45:03.526 - 115200,N,8,1
7    01-19-1998 16:45:03.536 - Initializing modem.
8    01-19-1998 16:45:03.536 - Send: AT<cr>
9    01-19-1998 16:45:03.866 - Recv: AT<cr>
10   01-19-1998 16:45:03.866 - Recv: 0<cr>
11   01-19-1998 16:45:03.866 - Interpreted response: OK
12   01-19-1998 16:45:03.866 - Send: AT &F<cr>
13   01-19-1998 16:45:03.866 - Recv: AT &F<cr>
14   01-19-1998 16:45:03.866 - Recv: <cr><lf>OK<cr><lf>
15   01-19-1998 16:45:03.866 - Interpreted response: OK
16   01-19-1998 16:45:03.866 - Send: AT E0 %U2 V0 &D2 &C1 S0=0<cr>
17   01-19-1998 16:45:03.866 - Recv: AT E0 %U2 V0 &D2 &C1 S0=0<cr>
18   01-19-1998 16:45:03.866 - Recv: 0<cr>
19   01-19-1998 16:45:03.866 - Interpreted response: OK
20   01-19-1998 16:45:03.866 - Send: ATS7=60\T0L1M1\N3%C3\Q3B0X4<cr>
21   01-19-1998 16:45:03.876 - Recv: 0<cr>
22   01-19-1998 16:45:03.876 - Interpreted response: OK
23   01-19-1998 16:45:03.876 - Waiting for a call.
24   01-19-1998 16:45:03.876 - Send: ATS0=0<cr>
```

Line 5 shows the baud rate, parity, data bits and stop bits. Lines 12, 16, and 20 show the operating system initialization strings.

The initialization strings invoked by Remote Access Server are located between the "Initializing modem" and "Waiting for a call" lines in the modem log file. Typically, there are three or four AT command sequences listed. The last command sequence is usually constructed using the options you have selected in the Modem Properties dialog box. This string usually contains entries for compression, error control, timeout settings, and so on. The strings proceeding the options init string are common to all configurations of this modem and contain reset, mode, and response code configuration. AT commands which are particularly important to proper modem sharing operation are those which specify the response format of the modem. These strings define how the modem reports negotiated speed, error control, and compression information upon establishing a carrier and whether this information is to be reported in numeric (V0) or verbose (V1) mode. Using your modem's AT command reference, determine which commands strings differ from the modems default settings and construct new initialization strings for IRC using these settings. If you are unsure of which settings may be important, try using the strings verbatim. In this example, the IRC primary initialization string could be set to "AT &F E0 %U2 V0 &D2 &C1 S0=0" and secondary initialization string to "ATS7=60\T0L1M1\N3%C3\Q3B0X4."

Re-enable IRC with Proper Initialization Strings

Re-enable IRC using the COM port and initialization string settings determined from the modem log file.

Appendix A
Suggested Modem Settings

The following tables provide suggested settings for when a modem is dedicated or shared in non-Windows-NT environments, and when the modem is shared in a Windows NT 4.0 environment.

> **NOTE**: Some of the initialization string entries in Tables A-1 and A-2 may be too long to be completely displayed on one line and consequently wrap to another line. When entering the string into IRC's modem configuration, combine wrapped lines into one string.
>
> Pay special attention to the numbers 0 and 1 to distinguish them from the letters O and I. The letter "O" does not appear in any of the modem strings.

Suggested Settings When Modem is Dedicated or Shared in non-Windows NT Environments

> **NOTE**: The **Port Setting** for all modems is **8-N-1**.

Table A-1
Dedicated or Shared in non-Windows NT Environment Modem Settings

Modem Selected	Baud	Init String #1	Init String #2
Cardinal Connecta 56K External Fax Modem	115200	AT&F1Q0V1&C1&D2	AT&M4&K1&H1&R2&I0B0X4
Compaq SpeedPaq 144 Data Fax Modem	19200	AT&FV1&C1&D2W1X4S95=47	AT\N3%C1S101=35\Q3B0N1X4
Compaq Microcom 415 External Fax Modem	57600	AT&FQ0V1&C1&D2S95=47	AT\N3%C3&K3B0N1X4

Continued

Dedicated or Shared in non-NT Environment Modem Settings *Continued*

Modem Selected	Baud	Init String #1	Init String #2
Compaq Microcom 510 56K Ext Fax Modem	57600	AT&F%U2V1&D2&C1	AT\N3%C3\Q3B0X4
Compaq Netelligent 56K ISA Fax Modem	57600	AT&FV1&C1&D295=47	AT\N3%C3&K3X4
Diamond SupraExpress 56e	115200	AT&F2&C1&D2V1Q0W2	ATL&Q5\N3%C3&K3BN1X4
Hayes Accura 144 Data Fax Modem	11900	AT&FV1W1&C1&D2S95=47	AT&Q5S36=7S48=7S46=138&K3
Hayes Accura 366 Fax + Voice	115200	AT&FV1&C1&D2S95=47	AT&Q5S46=138&K3B0N1X4
Hayes Accura 56k External Fax Modem 4703	115200	AT&F&C1&D2V1\V1	AT\N3%C1&K3B0B15X4
Hayes Accura 56k External Fax Modem 5674	115200	AT&FV1&C1&D2S95=47	AT&Q5S46=138&K3B0N1X4
Motorola Lifestyle 28.8 External	57600	AT&F&D2&C1V1\V3S95=47S90=249	AT\N7%C1\Q3B0N1X4
Motorola ModemSURFER External 28.8	57600	AT&F&C1&D2\V1V1W2	AT\N3%C1\Q3B%G1X4
Multi-Tech MT2834BA	57600	AT&FX4S25=20	AT&E1&E15&E4X4
Multi-Tech MT5634ZDX	115200	AT&F&C1&D2V1\V1	AT\N3%C1&K3B0B15N1X4
USR Sportster 14400 Fax	19200	AT&FV1&A3&B1&D2&S0	AT&M4&K1&H1&R2&I0B0X4
USR Sportster 28800 Internal	57600	AT&F1V1&C1&D2Q0&B1&A3	AT&M4&K1&H1&R2&I0B0X4
USR Sporster 28800-33600 External	57600	AT&F1V1&C1&D2Q0&B1&A3	AT&M4&K1&H1&R2&I0B0X4
USR Sportster 56000 External FAX Modem	57600	AT&F1Q0V1&C1&D2	AT&M4&K1&H1&R2&I0B0X4
USR Courier V.Everything/V.34	57600	AT&F1&B1&C1&D2Q0V1&A3	AT&M4&K1&H1&R2&I0B0X4
Zoom VFX14.4V	19200	AT&FV1Q0W1&C1&D2S95=47	AT&Q5S36=7S48=7\N3
Zoom Dualmode FaxModem 56Kx	115200	AT&FV1&C1&D2W1S95=47	AT\N3%C3&K3B0X4

Suggested Settings When Modem is Shared in Windows NT 4.0

The following table contains the suggested configuration settings for Integrated Remote Console when the modem usage is set to *shared*. These settings are dependent upon how the operating system is configured and assume that the modem was installed with the default settings. It is also assumes that the correct INF file is used when the modem is installed under Windows NT. Modems which require an INF file other than the set shipped standard with the operating system are noted.

NOTE: The **Port Setting** for all modems is **8-N-1**.

Table A-2
Shared in Windows NT 4.0 Environment Modem Settings

Modem Selected	Baud	Init String #1	Init String #2
Cardinal Connecta 56K External Fax Modem[1]	115200	AT&F1E0Q0V1&C1&D2	ATS7=60S19=0M1&M4&K1&H1&R2&I0B0X4
Compaq SpeedPaq 144 Data Fax Modem	19200	AT&FE0V1&C1&D2W1X4S95=47	ATS7=60S30=0L0M1\N3%C1S101=35\Q3B0N1X4
Compaq Microcom 415 External Fax Modem[1]	57600	AT&FE0Q0V1&C1&D2S95=47	ATS7=60S30=0L0M1\N3%C3&K3B0N1X4
Compaq Microcom 510 56K Ext Fax Modem[1]	57600	AT&FE0%U2V0&D2&C1	ATS7=60\T0L1M1\N3%C3\Q3B0X4
Compaq Netelligent 56K ISA Fax Modem[1]	57600	AT&FE0V1&C1&D2S95=47	ATS7=60S30=0L1M1\N3%C3&K3B+MS=,1,,,,X4
Diamond SupraExpress 56e[1]	115200	AT&F2E0&C1&D2V1Q0W2	ATS7=60S30=0LM1&Q5\N3%C3&K3BN1X4
Hayes Accura 144 Data Fax Modem	11900	AT&FE0V0W1&C1&D2S95=47	ATS7=60S30=0L0M1&Q5S36=7S48=7S46=138&K3

Continued

_____

[1] Requires INF file from modem manufacturer to complete modem installation in Windows NT. (Appropriate INF file not shipped with Windows NT.)

Shared in NT 4.0 Environment Modem Settings *Continued*

Modem Selected	Baud	Init String #1	Init String #2
Hayes Accura 366 Fax + Voice[1]	115200	AT&FE0V1&C1&D2S95=47	ATS7=60S30=0L0M1&Q5S46=138&K3B0N1X4
Hayes Accura 56k External Fax Modem 4703[1]	115200	AT&FE0&C1&D2V1\V1	ATS7=60S30=0L0M1\N3%C1&K3B0B15X4
Hayes Accura 56k External Fax Modem 5674[1]	115200	AT&FE0V1&C1&D2S95=47	ATS7=60S30=0L1M1&Q5S46=138&K3B0N1X4
Motorola Lifestyle 28.8 External	57600	AT&F&D2&C1E0V1\V3S95=47S90=249	ATS7=60\T0L0M1\N7%C1\Q3B0N1X4
Motorola ModemSURFER External 28.8	57600	AT&FE0&C1&D2\V1V0W2	ATS7=60S30=0L0M1\N3%C1\Q3B%G1X4
Multi-Tech MT2834BA External[1]	57600	AT&FE0X4S25=20	ATS7=60S30=0M1&E1&E15&E4X4
Multi-Tech MT5634ZDX External[1]	115200	AT&FE0&C1&D2V1\V1	ATS7=60L0M1\N3%C1&K3B0B15N1X4
USR Sportster 14400 Fax	19200	AT&FE0V1&A3&B1&D2&S0	ATS7=60S19=0L0M1&M4&K1&H1&R2&I0B0X4
USR Sportster 28800 Internal	57600	AT&F1E0V1&C1&D2Q0&B1&A3	ATS7=60S19=0L0M1&M4&K1&H1&R2&I0B0X4
USR Sporster 28800-33600 External	57600	AT&F1E0V1&C1&D2Q0&B1&A3	ATS7=60S19=0L0M1&M4&K1&H1&R2&I0B0X4
USR Sportster 56000 External FAX Modem[1]	57600	AT&F1E0Q0V1&C1&D2	ATS7=60S19=0M1&M4&K1&H1&R2&I0B0X4
USR Courier V.Everything/V.34[1]	57600	AT&F1&B1&C1&D2E0Q0V1&A3	ATS7=60S19=0L0M1&M4&K1&H1&R2&I0B0X4
Zoom VFX14.4V	19200	AT&FE0V0Q0W1&C1&D2S95=47	ATS7=60S30=0L1M1&Q5S36=7S48=7\N3
Zoom Dualmode FaxModem 56Kx[1]	115200	AT&FE0V1&C1&D2W1S95=47	ATS7=60S30=0L0M1\N3%C3&K3B0X4

Appendix B
Null-Modem Cable Description

For proper communication, Integrated Remote Console requires a null-modem cable with a complete set of modem control signals. The exact wiring diagram for this cable is shown in below. Cables are occasionally labeled as "null-modem" which do not conform to this diagram. Check with your cable vendor to insure that the cable meets the requirements shown below. Cables that differ from this specification may not function correctly.
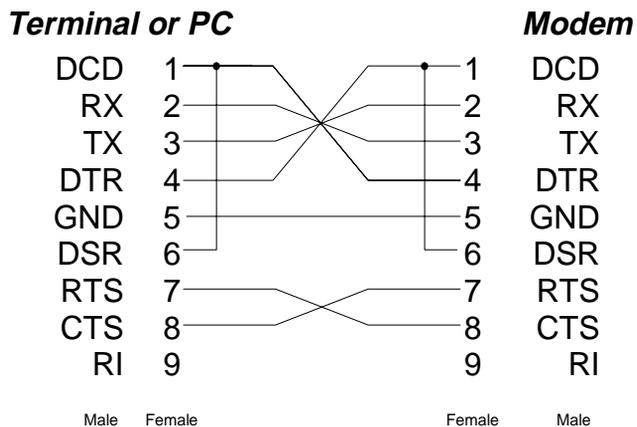
Figure B-1.   Null-modem cable requirements

Appendix C
Troubleshooting

POST Errors

Server displays "172-2 IRC Configuration Invalid" message during POST

Explanation: Before initializing, IRC does a quick check of the configured communications device before using it. If the configuration settings do not match a valid COM port, you receive the above message followed by either "COM Port Invalid," "Incorrect IRQ," or "PCI COM Port."

Solution: Return to the Compaq System Configuration Utility and check the following:

■ If you are using a non plug-n-play internal ISA modem, make sure that you have manually inserted a configuration file as described in the "Configuring a non "plug-n-play" ISA Modem" in Chapter 2.

■ If you are using an integrated serial port for connection to an external modem, terminal, or terminal server, make sure that the integrated serial port is configured for an *edge* triggered interrupt. See "Configuring an External Modem or Direct Connection" in Chapter 2 for more details.

■ Make sure the COM port and interrupt settings of Integrated Remote Console exactly match the hardware jumper settings on the internal modem, or integrated serial port settings if connecting to an external device.

Connection Problems

Due to the complexity and diversity of communications hardware, you may experience problems reliably connecting to IRC. A majority of these problems are due to improper configuration settings and can usually be remedied quickly by correcting the configuration error. The following section guides you through some possible configuration errors and their remedies.

This section is divided into three categories:

■ Connection problems using a modem in dedicated mode

■ Connection problems using a modem in shared mode

■ Connection problems using a direct-connection

Refer to the appropriate section depending upon your hardware configuration.

Connection problems using a modem in dedicated mode

Integrated Remote Console does not answer the phone in dedicated mode

The management console attempts to establish a connection with the managed server, but the phone is never answered.

Explanation: IRC cannot correctly place the modem in auto-answer mode.

Solution: This is most likely the result of a configuration or cabling error. Review the configuration, specifically:

■ If you are using an external modem, make sure that the modem is powered on and connected properly with the correct cable. The cable must be a straight-through cable with full modem control signal support. If the modem has configuration switches, make sure they are set to factory defaults.

■ Make sure IRC is *enabled* and at least one user is defined in the user database

■ Make sure the COM port and interrupt settings of IRC exactly match the hardware jumper settings on the internal modem, or integrated serial port settings if connecting to an external device.

■ Make sure that the value for *Maximum Baud Rate* is compatible with your modem. This setting should normally be 19200 for 14.4k modems, 38400 for 28.8k modems, and 57600 or 115200 for 33.6k, and 56k modems.

■ Make sure IRC is configured for either an *Internal Modem* or *External Modem*.

■ Make sure that a valid *Answer String* is configured. This should be *ATS0=1* unless your modem requires a different string.

Cannot obtain a login prompt in dedicated mode

When dialing into the managed server, the phone is answered and the modems complete negotiation, but a login prompt does not appear on the management console after three carriage returns are entered.

Explanation: IRC uses three carriage returns to verify a stable connection and to positively identify the call is for IRC. If this sequence is not correctly received by IRC, you do not receive a login prompt.

Solution: A number of different conditions can inhibit the correct reception of the carriage return sequence. In many instances, the problem may actually be caused by the management console and has nothing to do with how Integrated Remote Console is configured on the managed server. Possible solutions are listed below.

■ Insure that you are sending three carriage returns (**Enter** key) after a connection had been established with IRC.

■ Try using the same type and brand of modem in both the managed server and the management console. Differences in modem negotiation protocols, particularly if the modems are different speeds (33.6k vs. 14.4), may produce spurious characters before and after the modems have established a connection which can interrupt the carriage return sequence.

■ If you are using Compaq Insight Manager as the terminal application and have either a Compaq SpeedPaq 33.6 or U.S. Robotics modem installed in the management console, change the "initialize" string under Insight Manager's COM port setup from "AT&F&C1&D2E0S0=0" to "AT&F**1**&C1&D2**&B1**E0S0=0". This selects the hardware-flow control template and also specifies a *fixed* DTE baud rate.

■ If you have either a Compaq SpeedPaq 33.6 or U.S. Robotics modem in the managed server, make sure that &B1 is included in either the primary or secondary initialization string. If this type of modem is used in the management console, make sure that the initialization string used by your communications package includes &B1. See chapter 2 for information on correctly configuring the management console.

■ Double check the primary and secondary modem initialization strings with the requirements specified in Chapter 2. Check Appendix A for the appropriation initialization strings for your modem.

■ If you are using HyperTerminal to establish the connection, make sure that your IRC firmware is 1.41 or greater. Obtain the latest system ROM upgrade for your server to upgrade the Integrated Remote Console firmware.

■ Try the connection again following a cold power-cycle of the managed server. If problem only occurs after the server is warm-booted, obtain the latest system ROM upgrade for your server. IRC firmware versions 1.51 and greater fix a problem where IRC is unavailable following a warm boot.

Connection problems using a modem in shared mode

If you are unable to login to the IRC in *shared* mode, it is strongly recommended that you first troubleshoot the problem with modem sharing options set to *dedicated*. Once proper operation has been verified, return to *shared* mode and proceed in this section if the problem still exists.

If you are able to login to IRC, but are either unable or not consistently able to connect through Integrated Remote Console to operating system-based management, it is strongly recommended that you troubleshoot the problem by temporarily disabling IRC. Once proper operation of the modem has been verified in the operating system with Integrated Remote Console disabled, re-enable Integrated Remote Console and proceed in this section if the problem still exists.

This section assumes that there are no connection problems with IRC when the modem is configured as *dedicated*, and there are no connection problems to operating system-based management when Integrated Remote Console is disabled.

Managed Server does not answer the phone in shared mode

The management console attempts to establish a connection with IRC, but the phone is not answered.

Explanation: Operating system has taken ownership of the modem and disabled auto-answer mode.

Solution: Check the following:

■ Make sure that the operating system is not currently using the modem for another connection.

■ The operating system may have recently accessed the modem. IRC will regain ownership of the modem if no activity is detected for 60 seconds. Wait 60 seconds and try again.

■ If the modem is not configured correctly in the operating system, the operating system may fail to communicate with the modem and periodically retry this operation. These periodic attempts will gain ownership of the modem from IRC making it unavailable for login. Check for proper operation of the modem by temporarily disabling IRC. When proper operation with the operating system has been verified, re-enable IRC.

Cannot obtain a login prompt in shared mode

When dialing into the managed server, the phone is answered and the modems complete negotiation, but a login prompt does not appear on the management console after three carriage returns are entered.

Explanation: Three carriage returns are used to positively identify that an incoming call is intended for IRC. If this sequence is not correctly received by IRC or if IRC did not own the modem at the time the call was received, you do not receive a login prompt.

Solution: Assuming that the login prompt can reliably be obtained when the modem is in *dedicated* mode, the following are possible solutions:

■ Insure that you are sending three carriage returns (**Enter** key) within 10 seconds after a connection had been established with IRC. If any other character is received, or the carriage returns are received after the timeout period, the call is incorrectly forwarded to the operating system.

■ The modems on the managed server and the management console may be incompatible – even if the modems seem to work properly in *dedicated* mode. If the modems do not establish a consistently clean connection, spurious and/or erroneous characters received after the data carrier detect (DCD) signal interfere with the carriage return sequence, incorrectly forwarding the incoming call to the operating system. This is a problem particularly if the modems are from different manufacturers or of different speed classes. Try using the same type and brand of modem in both the managed server and the management console.

■ If you are using a Compaq SpeedPaq 56K or Rockwell-based 56k-flex modem in the managed server, make sure that you have upgraded the modem firmware to the latest version offered by the modem manufacturer. Early 56kflex firmware versions (before 1.12) incorrectly generate the data carrier detect signal (DCD) while the modem is reporting the connect string. This interferes with the reception of the carriage return sequence necessary to invoke the login prompt.

■ The operating system may have recently accessed the modem. Integrated Remote Console regains ownership of the modem if no activity is detected for 60 seconds. Wait 60 seconds and try again.

■ If the modem is not configured correctly in the operating system, the operating system may fail to communicate with the modem and periodically retry this operation. These periodic attempts gain ownership of the modem from Integrated Remote Console making it unavailable for login. Check for proper operation of the modem by temporarily disabling Integrated Remote Console. When proper operation with the operating system has been verified, re-enable Integrated Remote Console.

Cannot dial into operating system-based management in shared mode

You can connect to IRC, but attempts to dial into the server's operating system fail.

Explanation: If an incoming call is not positively identified as destined for Integrated Remote Console, the call is forwarded to the operating system. Integrated Remote Console uses its configured initialization strings to reset the modem after it regains ownership. If these initialization strings are not compatible with the initialization strings used by the operating system, the modem may not return data in the format which the operating system expects. This is typically a problem with the response code format. Windows NT, for example, configures many modems (but not all) for numeric response codes. (V0). If the configured initialization string in IRC does not specifically contain the command to configure the modem for numeric responses, the modem returns to its default state which is usually verbose responses. As a result, the operating system may be returned a verbose connect string like:

"CONNECT 38400/V34/LAPM/V42BIS/33600:TX/33600:RX"

when it is expecting a numeric code like "17." For incoming calls to be processed correctly, the modem must be configured identically by both the operating system and IRC.

Solution: Reconfigure IRC's communication settings to more accurately match those of the operating system.

■ Make sure that IRC's primary and secondary initialization strings are compatible with how the modem is used by the operating system. See Chapter 6 for more information on modems and Appendix A for suggested initialization strings.

Connection problems using a direct-connection

Cannot obtain a login prompt using a direct-connection

After opening a direct serial connection to IRC, a login prompt does not appear on the management console after three carriage returns are entered.

Explanation: In direct connect mode, IRC waits for three carriage returns to invoke the login prompt after the data carrier detect (DCD) signal is driven active by the terminal or terminal server. Failure to obtain a login prompt either means that the carriage returns are not being received correctly by IRC, or the data carrier detect (DCD) signal is inactive.

Solution: Check the following:

■ Make sure you are using the appropriate null-modem cable as described in Appendix B. Unfortunately, many cables are labeled as "null-modem" but do not contain the full complement of necessary control signals. IRC requires a full null-modem cable as shown in Appendix B to operate correctly.

■ Make sure that the communication settings match between the terminal or terminal server and IRC. These include baud rate, data bits, stop bits and parity settings.

■ Make sure that the terminal or terminal server is configured for *hardware flow control*.

■ Make sure that the terminal or terminal server is configured to assert DTR when a connection is opened and de-assert DTR when a connection is closed.

■ If you are using HyperTerminal to establish the connection, make sure that your IRC firmware is 1.41 or greater. Obtain the latest system ROM upgrade for your server to upgrade the IRC firmware.

■ Try the connection again following a cold power-cycle of the managed server. If the problem only occurs after the server is warm-booted, obtain the latest system ROM upgrade for your server. Integrated Remote Console firmware versions 1.51 and greater fix a problem where IRC is unavailable following a warm boot.

Problems while using IRC

Screen temporarily pauses during menus or remote console text

Screen inexplicably pauses for several seconds while menus or remote console text is being drawn.

Explanation: Certain U.S. Robotics 28.8 or 33.6 modems contain a firmware bug that results in this condition during ANSI text connections.

Solution: Obtain a firmware upgrade from modem manufacturer.

■ If you are using either a Compaq SpeedPaq 33.6 or U.S. Robotics 28.8 or 33.6 modem in either the managed server or management console and see this behavior, contact U.S. Robotics for a firmware update.

Terminal doesn't scroll correctly in Remote Console Mode

When entering remote console mode, screen is painted and is immediately scrolled. Actions that cause the screen on the managed server to scroll are not be properly echoed on the management console.

Explanation: To scroll correctly, IRC needs to know the size of the terminal window on the management console.

Solution: Check the following:

■ Adjust the *terminal size* setting by returning to the IRC Main menu and selecting the "Remote Console…" submenu. For most ANSI terminal emulators and TELNET clients, the default terminal size is 24 rows.

Terminal loses characters or doesn't paint correctly in Remote Console Mode

Terminal contains a jumbled representation of the managed server's screen, particularly after heavy video activity (large number of scrolls or repaints) on the managed server.

Explanation: IRC uses hardware RTS/CTS handshaking to control the data rate to the management console. If hardware flow control is not enabled on both the management console and the managed server, character overruns can occur resulting in loss of characters and incorrect display.

Solution: Insure that hardware flow control is enabled and used on both the management console and the managed server.

■ If you are using Compaq Insight Manager as the terminal application and have either a Compaq SpeedPaq 33.6 or U.S. Robotics modem installed in the management console, change the "initialize" string under Insight Manager's COM port setup from "AT&F&C1&D2E0S0=0" to "AT&F**1**&C1&D2**&B1**E0S0=0". This chooses the hardware-flow control template and also specifies a *fixed* DTE baud rate.

■ Make sure that either the primary or secondary initialization string contains the appropriate AT command to place the modem in hardware-flow control on the managed server. See Chapter 2 for information on this modem setting.

"View Reboot Sequence" is grayed out

Menu item "3. View Reboot Sequence" is gray and cannot be selected.

Explanation: The "View Reboot Sequence" menu option is only available if IRC contains a valid boot sequence. The boot sequence recorder is only activated under certain conditions. See Chapter 4 "View Reboot Sequence" for more information on this feature.

Solution: If you believe a valid boot sequence should be available, check the following:

■ Make sure that the server has not been power-cycled since the capture event.

■ If you have the modem sharing options set to *shared*, obtain the latest system ROM upgrade for your server. IRC firmware versions 1.51 and greater fix a problem where IRC would accidentally clear the boot sequence during certain modem sharing events.

Index